GARGAON COLLEGE
PO, PSO & CO of CBCS Courses

A. Programme Outcome of B.A. programme:

1. Critical Thinking: Ability to analyse, synthesize and integrate knowledge. Capability to evaluate the validity of arguments and conclusion.

2. Effective Communication: Proficiency in speaking, reading, writing and listening in English and one Indian language and find meaning of the world by connecting people, ideas, books, media and technology.

3. Social Interaction: Link with society and intercede the disagreement and help to reach conclusion in group sitting. Demonstrate intellectual awareness and competencies. Reflect on one's cultural identities and values.

4. Effective Citizenship: Promote active citizenship and community engagement. Ability to understand the national development, informed awareness of issues and participate in civic life.

5. Ethics: Understand and recognised value system, moral dimensions and self-responsibility for nation and society. Demonstrate personal and intellectual integrity and academic accountability. Collaborate respectfully with others, individually and in teams.

6. Environment and Sustainability: Understand the issues and perspectives of environment context and sustainable development.

7. Self-directed and lifelong learning: Acquire the ability to engage in independent and lifelong learning in broad context of socio-technological changes.

8. Individual and team work: Function effectively as an individual and as a member or leader of diverse teams and in multi-disciplinary settings.

9. Evaluate and conduct research: Engage in scholarly inquiry to identify and investigate questions of a theoretical and applied nature which identify gaps and limitations in the existing literature, understand the principles of the research process, apply appropriate research methodologies to specific problems and develop intellectual independence and practices self-directed inquiry.

10. Depth of understanding: Demonstrate detailed knowledge and perspectives across disciplinary boundaries. Develop a detailed understanding of the current state of knowledge in one or more disciplines. Recognise the value, use and limits of multi-disciplinary learning. Cultivate an openness to consider and engage alternative research perspectives.

B. Programme outcome of B. Sc Programme:

1. Fundamental knowledge of science: Understood the basic concepts, fundamental principles and the scientific theories related to various scientific phenomena and relevancies in day to day life .Acquired knowledge access a range of fields with in-depth knowledge in at least one or more disciplines. Demonstrating & understanding of the local and global context in which science is practiced.

2. Analyzing problem: Identifying, formulating, analyzing a scientific problem data both critically and systematically to draw an objective. Developing skills to reach a substantial solution and presenting them in an effective and efficient manner.

3. Designing of solution: Using research based knowledge and research methods including designation to solve problems of a science discipline including its data interpretation & synthesis of information to conduct a valid conclusion in significant project, problem or investigation forms. To design safety and interpret scientific research knowledge needs to be acquired and performing laboratory experiments.

4. Conduct investigation of complex problem: Skills to observe complex problems and drawing logical inferences from scientific experiments. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.

5. Modern tool usages: Create, select, and apply appropriate techniques, resources and modern IT tools to investigate problems. Gets exposure of a breadth of experimental techniques using modern instruments.

6. Science and society: Developed scientific outlook that in either subjects like humanities, performing arts, social sciences etc. can have great and effectively influence

which inspires in creation of new scientific theories and innovations. This new scientific innovations leads society more civilized.

7. Environment and Sustainability: Realised how science how interdisciplinary approach helps in providing better solutions and new ideas for sustainable developments.

8. Ethics: Imbibed ethical principles and learn professionalism and responsibilities and norms of scientific practices to work in team leading to highly cultured and civilized personality.

9. Individual and team work: Functions effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings to accomplish common goals and demonstrate professional behaviour.

10. Communications: Develop various communications skills on scientific activities with science discipline community and society. Develop to communicate convincingly and effectively about scientific information and research results in written and oral formats for future contributions to expert and non – expert audiences.

11. Lifelong learning: Pursuing knowledge, a lifelong activity and the need for and have preparation and ability to engage in independent and lifelong learning in bright context to technological changes to achieve success.

12. Social interaction: Interact with society, find a job and earn daily wages.

13. Awareness generation: Get information about scientific theories. Develop criteria to organize and present different type of work in academic and professional environments.

B. Program Outcomes of B. COM. programme:

1. Commercial Knowledge: Demonstrate interest in and at least a basic understanding of the business world and the industry you desire to work within. It also helps to have awareness surrounding the importance of things that affect a business. It includes the ability to be aware commercially, incorporate key commercial skills and demonstrate the value of understanding the business performance in the market.

2. Problem Analysis: Demonstrate the Logical sequence for solving problems and improving the quality of decisions. It is also a guide to identifying which tools and techniques to apply for value-based inferences. It helps in producing a clear statement of the identified problem/opportunity, establishing a process for continuous improvement and holding the gains, gathering all necessary information associated with a problem/opportunity, Implementing & testing a plan, and enabling man to satisfy his innumerable wants and thereby promoting social welfare.

3. Conduct Investigation of Complex Problems: Engaged in investigating the complex problems associated with the business. Also demonstrate the process tools and techniques for the solution of complex problems associated with decision making, tax planning, and budget preparation etc. This includes the ability to engage effectively with the solution of complex problems in the light of the concepts, principles and ethics.

4. Modern Tool Usages: Demonstrate the tools and technique used in the business and business decision making. This includes the tools like PERT & CPM in the management of projects different techniques for controlling the expenditures.

5. Commerce and Society: Understand the values that help to increase the standard of living and quality of life this also includes the ability to expansion and modernization of aids to trade. Link producers and consumers through retailers and wholesalers and also through the aids to trade.

6. Environment and Sustainability: Demonstrate a broad and flexible educational preparation for a range of professional, business-related careers in private and public enterprise. This includes the ability to demonstrate an appreciation of the broad environment in which business operates, contribute effectively to the successful operation of business apply analytical skills, relevant theory and logical thought to decision making processes within a business, communicate effectively in a business environment, both verbally and in writing, demonstrate commitment to ethical and socially responsible business practice, demonstrate detailed understanding of theory and practice in key business specializations and apply specialist skills to analyze issues and develop appropriate reports or other documentation.

7. Ethics: Demonstrate the value and principles of business for implementing the same in to the reality. This also includes the ability to provide a basic foundation for developing a business concern and business practices, understand the perpetual succession of the business.

8. Individual and Team Work: Function effectively as an individual and as a member or leader of diverse teams and in multi-disciplinary settings.

9. Effective Communication: Demonstrate the ability to extract and convey information accurately in variety formats for successful business implementation. This includes the ability to communicate concepts and information clearly and in various formats.

10. Project Management and Finance: Demonstrate the plan, co-ordination and control of the complex and diverse activities of modern industrial and commercial projects. This also includes the ability to provide a structure for goals and objectives.

11. Life Long Learning: Acquire the ability to engage in independent and lifelong learning in broad context of socio-technological changes.

12. Growth of Business Skill: Demonstrate the basic foundation for the start-up of a business and the strategic decisions for the same. This includes the ability to understand the dynamic strategy formulation for the business, investment decision and performance evaluation and decision making.

13. Proper Use of Finance and Accounts: Understand how finance plays a crucial role in the business and the preparation of proper accounts provides a base for evaluation the same. This also includes the ability for investment decision making, budget preparation and execution, performance evaluation and audit of the accounts.

14. **Mentality for Business Venture**: Understand the value of business culture for the maximization of wealth and profit that enlighten the financial independence and security. This includes the ability to start a new venture and wealth and profit maximization.

Programme Outcome
অসমীয়া বিভাগ
গড়গাঁও মহাবিদ্যালয়
শিমলুগুৰি, শিৱসাগৰ

ক) প্ৰথম ষাণ্মাসিক

১)পাঠ্যক্ৰমৰ নাম—অসমীয়া সাহিত্যৰ বুৰঞ্জী (শংকৰোত্তৰ যুগ পৰ্যন্ত)

পাঠ্যক্ৰম সংখ্যা-C1(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ এই কাকতৰ যোগেদি প্ৰথমতে অসমীয়া সাহিত্যৰ যুগবিভাজনৰ পৰিচয়েৰে ছাত্ৰ-ছাত্ৰীসকলক অসমীয়া সাহিত্যৰ সমগ্ৰ পৰিক্ৰমাৰ এক সাধাৰণ পৰিচয় প্ৰদান কৰি লৈ তাৰ পাছত লোক সাহিত্যৰ পৰা শংকৰোত্তৰ যুগলৈকে ৰচিত অসমীয়া সাহিত্যৰাজিৰ সামগ্ৰিক গতি-প্ৰকৃতিৰ ধাৰণা দিবলৈ বিচৰা হৈছে।

২)পাঠ্যক্ৰমৰ নাম—অসমীয়া সাহিত্যৰ বুৰঞ্জী (অৰুণোদই যুগৰ পৰা সাম্প্ৰতিক কাল পৰ্যন্ত)

পাঠ্যক্ৰম সংখ্যা-C2(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ সাহিত্যৰ বুৰঞ্জীৰ অন্তৰ্গত হিচাপে ছাত্ৰ-ছাত্ৰীসকলক আধুনিক অসমীয়া ভাষা-সাহিত্যৰ প্ৰতিষ্ঠাকালৰে পৰা সাম্প্ৰতিক কাললৈকে সাহিত্যৰ গতি-প্ৰকৃতিৰ ধাৰণাৰ প্ৰদানেই এই কাকতৰ উদ্দেশ্য।

খ)দ্বিতীয় ষাণ্মাসিক

৩) পাঠ্যক্ৰমৰ নাম—ভাষা বিজ্ঞানৰ পৰিচয়

পাঠ্যক্ৰম সংখ্যা-C-3(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ প্ৰাচ্য আৰু পাশ্চাত্যৰ ভাষা সম্পৰ্কীয় চিন্তা-চৰ্চাৰ ইতিহাস জনাৰ লগতে ভাষা আৰু ভাষা বিজ্ঞান সম্পৰ্কীয় বিভিন্ন দিশসমূহৰ পৰিচয় পাব পৰাকৈ এই কাকতখন প্ৰস্তুত কৰা হৈছে।

৪)পাঠ্যক্ৰমৰ নাম—সাহিত্যতত্ত্ব

পাঠ্যক্ৰম সংখ্যা-C-4(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ অসমীয়া সাহিত্য অধ্যয়নৰ তাত্ত্বিক আধাৰৰূপে ভাৰতীয় তথা পাশ্চাত্য সাহিত্যতত্ত্বৰ জ্ঞান অপৰিহাৰ্য। এই দুয়ো পৰম্পৰাৰ সাহিত্যতত্ত্ব প্ৰাথমিক জ্ঞান দিবৰ বাবে এই কাকত প্ৰস্তুত কৰা হৈছে।

গ)তৃতীয় ষাণ্মাসিক

৫)পাঠ্যক্ৰমৰ নাম—সাহিত্য সমালোচনা

পাঠ্যক্ৰম সংখ্যা-C-5(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ সাহিত্য সমালোচনাৰ সাহিত্য অধ্যয়নৰ অপৰিহাৰ্য অংগ। সেয়েহে বিভিন্ন প্ৰকাৰৰ সাহিত্য সমালোচনাৰ পৰিচয় আৰু পদ্ধতি তথা বিভিন্ন প্ৰকাৰৰ সাহিত্যৰ স্বৰূপ সম্পৰ্কীয় ধাৰণা প্ৰদানৰ উদ্দেশ্য কৰি এই কাকতখন প্ৰস্তুত কৰা হৈছে।

৬)পাঠ্যক্ৰমৰ নাম—অসমীয়া কবিতাৰ চানেকি

পাঠ্যক্ৰম সংখ্যা-C-6(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ লোক কবিতাৰ পৰা আৰম্ভ হোৱা অসমীয়া কবিতাৰ গতি-প্ৰকৃতিৰ সম্পৰ্কে ধাৰণা দিয়াৰ উদ্দেশ্যে এই কাকতখন প্ৰস্তুত কৰা হৈছে। কবিতাৰ বিশদ ধাৰণাৰ কাৰণে আৰম্ভণিৰ পৰা আধুনিক কাল পৰ্যন্ত কেইটিমান নিৰ্বাচিত কবিতা এই কাকতত বিশেষভাৱে পঢ়িবলৈ দিয়া হৈছে।

৭)পাঠ্যক্ৰমৰ নাম—অসমৰ সংস্কৃতি অধ্যয়ন

পাঠ্যক্ৰম সংখ্যা-C-7(৬ ক্ৰেডিট)

পাঠ্যক্রমৰ উদ্দেশ্যঃ সংস্কৃতিৰ সাধাৰণ ধাৰণাসহ অসমৰ নৃ-গোষ্ঠী আৰু সংস্কৃতিৰ সম্পৰ্কে ছাত্ৰ-ছাত্ৰীক অৱগত কৰাবৰ বাবে এই কাকতখন প্ৰস্তুত কৰা হৈছে।

ঘ)চতুৰ্থ ষাগ্মাসিক

৮)পাঠ্যক্ৰমৰ নাম—তুলনামূলক সাহিত্যৰ পদ্ধতি আৰু প্ৰয়োগ

পাঠ্যক্ৰম সংখ্যা-C-8 (৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ এই কাকতে সাহিত্য অধ্যয়নৰ জগতত উদীয়মান বিষয় তুলনামূলক সাহিত্যৰ সাধাৰণ ধাৰণা দিয়াৰ লগতে ভাৰতীয় সাহিত্য তথা অসমীয়া সাহিত্যৰ প্ৰেক্ষাপটত তুলনামূলক সাহিত্য অধ্যয়নৰ প্ৰাসংগিকতা আৰু প্ৰণালীৰ আভাস দিব।

৯)পাঠ্যক্ৰমৰ নাম—ভাৰতীয় আৰ্য ভাষা আৰু অসমীয়া ভাষা

পাঠ্যক্ৰম সংখ্যা-C-9 (৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ ভাৰতীয় আৰ্যভাষাৰ ক্ৰমবিকাশৰ ৰূপৰেখা আৰু সংস্কৃত, পালি আৰু প্ৰাকৃত ব্যাকৰণৰ বৈশিষ্ট্যসমূহৰ পৰিচয় পৰাকৈ কাকতখন প্ৰস্তুত কৰা হৈছে। সংস্কৃত, পালি আৰু প্ৰাকৃত ভাষাৰ স্বৰূপৰ লগত পৰিচয় প্ৰদানৰ বাবে এই ভাষাৰবোৰৰ নিৰ্বাচিত পাঠ অধ্যয়ন কৰিবলৈ দিয়া হৈছে।

১০)পাঠ্যক্ৰমৰ নাম—অসমীয়া গদ্যৰ চানেকি (ক)

পাঠ্যক্ৰম সংখ্যা-C-10 (৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ প্ৰাচীন কালতে উদ্ভৱ ঘটা অসমীয়া গদ্য সাহিত্যই আধুনিক কালত আহি বৈবিধ্য-বৈচিত্ৰ্যময় ৰূপ লাভ কৰিছে। এই কাকতত এই গদ্যৰ গতি-ধাৰাৰ সম্পৰ্কে অৱগত হ'বৰ বাবে নিৰ্বাচিত পাঠসহ ধাৰণা দিবৰ চেষ্টা কৰা হৈছে।

ঙ) পঞ্চম ষাগ্মাসিক

১১)পাঠ্যক্ৰমৰ নাম—অসমীয়া নাটক

পাঠ্যক্ৰম সংখ্যা-C-11(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ অসমীয়া নাট্য সাহিত্যৰ আভাসৰ বাবে প্ৰাচীন কালৰে পৰা সৃষ্টি হোৱা কেইখনমান নিৰ্বাচিত নাটক অধ্যয়নেৰে অসমীয়া নাট্য সাহিত্যৰ গতি-বিধি সম্পৰ্কে এই কাকতখনৰ জৰিয়তে জানিব পাৰিব।

১২)পাঠ্যক্ৰমৰ নাম—অসমীয়া ভাষাৰ ভাষাবৈজ্ঞানিক অধ্যয়ন

পাঠ্যক্ৰম সংখ্যা-C-12(৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্যঃ অসমীয়া ভাষাৰ ধ্বনিতত্ত্ব, ৰূপতত্ত্ব, বাক্যতত্ত্বৰ সম্পৰ্কে পৰিচয় পাব পৰাকৈ এই কাকতখন যুগুত কৰা হৈছে।

১৩)পাঠ্যক্ৰমৰ নাম—অসমীয়া ব্যাকৰণ, অভিধান, আৰু জতুৱা প্ৰয়োগ

পাঠ্যক্ৰম সংখ্যা- DSE-1 (৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্য-অসমীয়া ভাষাৰ শুদ্ধ উচ্চাৰণ, শুদ্ধ আখৰ জোঁটনি, অসমীয়া জতুৱা ঠাঁচ আৰু খণ্ডবাক্যৰ প্ৰয়োগৰ লগতে উপযুক্ত পৰিভাষাৰ প্ৰয়োগ, অসমীয়া ব্যাকৰণৰ বিবিধ দিশ আৰু অসমীয়া অভিধানৰ সাধাৰণ পৰিচয় পাব পৰাকৈ কাকতখন প্ৰস্তুত কৰা হৈছে।

১৪)পাঠ্যক্ৰমৰ নাম—ভাৰতীয় সাহিত্যৰ পৰিচয়

পাঠ্যক্ৰম সংখ্যা- DSE-2 (৬ ক্ৰেডিট)

পাঠ্যক্ৰমৰ উদ্দেশ্য-বহু ভাষাৰে প্ৰকাশ লাভ কৰা ভাৰতীয় সাহিত্যৰ একক ৰূপত পৰিচয় প্ৰদানৰ লগতে নিৰ্বাচিত ৰচনাৰ অধ্যয়নৰ যোগেদি তাৰ কিছু আভাস দিবৰ উদ্দেশ্যে এই কাকতখনি পাঠ্যক্ৰমত সন্নিবিষ্ট কৰা হৈছে।

চ) ষষ্ঠ ষাণ্মাসিক

১৫)পাঠ্যক্রমৰ নাম—অসমীয়া গদ্যৰ চানেকি (খ)

পাঠ্যক্রম সংখ্যা-C13(৬ ক্রেডিট)

পাঠ্যক্রমৰ উদ্দেশ্যঃ অসমীয়া গদ্যৰ নিৰ্বাচিত অংশৰ অধ্যয়নৰ যোগেদি আধুনিক কালৰ সৃষ্টিশীল গদ্য সাহিত্যৰ গতি-প্রকৃতি সম্পৰ্কে ছাত্র-ছাত্রীয়ে জানিব পৰাকৈ এই কাকত প্রস্তুত কৰা হৈছে।

১৬)পাঠ্যক্রমৰ নাম—অসমৰ ভাষা আৰু লিপি

পাঠ্যক্রম সংখ্যা-C14 (৬ ক্রেডিট)

পাঠ্যক্রমৰ উদ্দেশ্যঃ এই কাকতখনৰ যোগেদি অসমৰ ভাষাৰ সাধাৰণ পৰিচয়ৰ লগতে অসমীয়া ভাষা আৰু উপভাষাৰ সাধাৰণ পৰিচয় ছাত্র-ছাত্রীসকলে পাব পাৰিব। অসমৰ ভাষাৰ ভাষাতাত্ত্বিক বৈশিষ্ট্য, অসমীয়া ভাষা আৰু আর্যভিন্ন ভাষাৰ আদান-প্রদান ইত্যাদি বিষয়সমূহৰ সামগ্রিক পৰিচয় পাব পৰাকৈ এই কাকতখন প্রস্তুত কৰা হৈছে।

১৭)পাঠ্যক্রমৰ নাম—বিশ্ব সাহিত্যৰ পৰিচয়

পাঠ্যক্রম সংখ্যা- DSE-3 (৬ ক্রেডিট)

পাঠ্যক্রমৰ উদ্দেশ্য-'বিশ্ব সাহিত্য' সম্পৰ্কে ছাত্র-ছাত্রী ধাৰণা স্পষ্ট কৰিবৰ বাবে এই কাকতখন প্রস্তুত কৰা হৈছে। বিশ্ব সাহিত্যৰ ধাৰণা বা আভাস দিবৰ বাবে ইয়াতে কিছুমান বিশ্ব খ্যাত পাঠ ছাত্র-ছাত্রীক অধ্যয়ন কৰিবলৈ দিয়া হৈছে।

১৮)পাঠ্যক্রমৰ নাম—বিশেষ লেখক

পাঠ্যক্রম সংখ্যা- DSE-4(A)(৬ ক্রেডিট)

পাঠ্যক্রমৰ উদ্দেশ্য-ভূপেন হাজৰিকা, ভবেন্দ্র নাথ শইকীয়া, বীৰেন্দ্রকুমাৰ ভট্টাচার্য্য, মামণি ৰয়চম গোস্বামী আৰু নিৰুপমা বৰগোহাঞিৰ দৰে অসমীয়া সাহিত্যৰ কেইজনমান প্রতিষ্ঠিত সাহিত্যিকৰ জীৱন আৰু সাহিত্যকৃতিৰ আভাস দিবৰ উদ্দেশ্য কৰি এই কাকতখন প্রস্তুত কৰা হৈছে। ছাত্র-ছাত্রীসকলে ইয়াত তেওঁলোকে নিৰ্বাচন কৰা সাহিত্যিকগৰাকীক প্রজ্ঞা আৰু সাধনাক অনুধামন কৰাৰ সুযোগ পাব।

১৯)পাঠ্যক্রমৰ নাম—প্রকল্প

পাঠ্যক্রম সংখ্যা- DSE-4(B)(৬ ক্রেডিট)

পাঠ্যক্রমৰ উদ্দেশ্য-গৱেষণা কৰ্মৰ সাধাৰণ ধাৰণাসহ প্রায়োগিক ক্ষেত্রত গৱেষণা কৰ্ম সম্পাদনৰ অভিজ্ঞতা প্রদানৰ বাবে এই কাকতখন প্রস্তুত কৰা হৈছে।

PROGRAMME SPECIFIC OUTCOMES (PSO) & COURSE OUTCOME (CO)
DEPARTMENT OF ECONOMICS, GARGAON COLLEGE

SEMESTER I (HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic principles of microeconomic theory.

PSO 2: Understand the basic concept of microeconomics

PSO 3: Apply their knowledge to analyze real-life situations

PSO 4: Acquaint with some basic mathematical methods related to economics.

PSO 5: Understand the various methods of applying mathematical techniques to economic theory in general.

Course Outcome (CO)

Course Code: ECNHC101

Course Title: Introductory Microeconomics

Students will be able to learn about:

CO 1: Scope and method of economics, types, Goals of Microeconomics, the economic problems, Economic models, the basic competitive model & economic systems.

CO 2: Individual and market demand/supply; Individual and market demand/supply schedule, Individual and market demand/supply curve, determinants of demand/supply, law of demand & law of supply, elasticity and its application, consumer surplus, producer surplus.

CO 3: Budget constraint, indifference curves, income and substitution effects

CO 4: Behaviour of profit maximizing firms, output decisions, Short-run and Long run costs, economies and diseconomies of scale, Imperfect Market Structure

CO 5: Labour market, Land market, Resource Allocation and the Mix of Output in Competitive Markets, Distribution of IncomeMarginal Productivity Theory, labour markets and public policy

Course Code: ECNHC102

Course Title: Mathematical Methods for Economics–I

Students will be able to learn about:

CO 1: Preliminaries logic and proof techniques, number systems, intervals, sets, ordered pairs, cartesian products, and relations

CO 2: Functions, types of functions, properties and graphs, limit of a function.

CO 3: Differentiable functions, geometric interpretation of derivative, rules of differentiation, economic application of derivatives

CO 4: Rules and Techniques of integration, applications of integration to economic problems, application of integration in case of consumer's surplus and producer's surplus.

CO 5: Linear first order differential equation and economic applications of differential equation

SEMESTER I (GENERIC ELECTIVE)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic principles of microeconomic theory.

PSO 2: Understand the basic concept of microeconomics

PSO 3: Apply their knowledge to analyze real-life situations

Course Outcome (CO)

Course Code: ECNGE1

Course Title: Introductory Microeconomics

Students will be able to learn about:

CO 1: Scope and method of economics, types, goals of microeconomics, the economic problems, economic models, the basic competitive model & economic systems.

CO 2: Individual and market demand/supply; individual and market demand/supply schedule, individual and market demand/supply curve, determinants of demand/supply, law of demand & law of supply, elasticity and its application, consumer surplus, producer surplus.

CO 3: Budget constraint, indifference curves, income and substitution effects

CO 4: Behaviour of profit maximizing firms, output decisions, short-run and long run costs, economies and diseconomies of scale

CO 5: Labour market, land market, competitive labour markets, labour markets and public policy

SEMESTER I (NON-HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic principles of microeconomic theory.

PSO 2: Understand the basic applications of microeconomic theory.

Course Outcome (CO)

Course Code: ECNGC101

Course Title: Principles of Microeconomics - I

Students will be able to learn about:

CO 1: Problem of scarcity and choice, demand and supply, applications of demand and supply elasticity of demand

CO 2: Budget constraint, concept of utility, income and substitution effects, consumer choice and indifference curves

CO 3: Production behaviour of profit maximising firms, choice of technology, isoquants and isocost lines, equilibrium condition.

CO 4: short run and long run costs, revenue and profit maximizations, economies and diseconomies of scale, long run adjustments.

SEMESTER II (HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic concept of macroeconomics

PSO 2: Understand the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variables

PSO 3: Acquaint with some fundamental mathematical methods related to economic theories.

PSO 4: Understand the methods of applying mathematical techniques to real-life situations

Course Outcome (CO)

Course Code: ECNHC201

Course Title: Introductory Macroeconomics

Nature of the Course: Core

Students will be able to learn about:

CO 1: Scope and limitations of macroeconomics, concepts of national income, real versus nominal gdp, gdp and welfare

CO 2: Rules and approaches of measurement of gdp, difficulties of estimating national income, circular flow of income and expenditure, national income accounting for an open economy

CO 3: Definition and functions of money, quantity theory of money, approaches of demand for money, money supply

CO 4: Meaning, types, causes and effects of inflation, basic concept of deflation, hyperinflation, anti-inflationary measures, trade cycle

CO 5: Theory of Determination of Income and Employment, Aggregate Demand and Aggregate Supply, equilibrium aggregate output, Product market and Money Market, fiscal and monetary multipliers.

Course Code: ECNHC202

Course Title: Mathematical Methods for Economics - II

Students will be able to learn about:

CO 1: Difference equation and its economic applications

CO 2: Systems of linear equations, matrices-elementary operations, determinants and their properties, application of Cramer's rule

CO 3: Partial and Total differentiation and economic applications, Indifference curve analysis, Production Function Analysis, Cobb-Douglas Production Function and its Properties; CES Production Function and its properties.

CO 4: Unconstrained optimization and its Economic Applications

CO 5: Constrained optimization, consumer's equilibrium and producer's equilibrium.

SEMESTER II (GENERIC ELECTIVE)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic concept of macroeconomics

PSO 2: Understand the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variables

Course Outcome (CO)

Course Code: ECNGE2

Course Title: Introductory Macroeconomics

Students will be able to learn about:

CO 1: Scope and limitations of macroeconomics, concepts of national income, real versus nominal gdp, gdp and welfare

CO 2: Approaches of measurement of gdp, difficulties of estimating national income, circular flow of income and expenditure, national income accounting for an open economy

CO 3: Definition and functions of money, quantity theory of money, approaches of demand for money, money supply, credit creation

CO 4: Meaning, types, causes and effects of inflation, basic concept of deflation, hyperinflation, anti-inflationary measures

CO 5: Theory of Determination of Income and Employment, Aggregate Demand and Aggregate Supply, equilibrium aggregate output, Product market and Money Market, fiscal and monetary multipliers.

SEMESTER II (NON-HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic behaviour of individual economic agents

PSO 2: Understand the behaviour of the consumer, producer and competitive firm.

PSO 3: Understand the behaviour of the Imperfect Competition.

Course Outcome (CO)

Course Code: ECNGC201

Course Title: Principles of Microeconomics - II

Students will be able to learn about:

CO 1: Perfect Competition, equilibrium of the firm in the short run and long run, Allocative efficiency under perfect competition

CO 2: Theory of a Monopoly Firm, short run and long run price and output decisions of a monopoly firm, Monopolistic competition, Oligopoly

CO 3: Consumer and producer theory in action externalities, public goods; imperfect information: adverse selection, moral hazard, social choice, government inefficiency, market failure, sources of market failure.

CO 4: Demand for inputs; labour markets, land markets, profit maximisation condition in input markets, input demand curves, distribution of Income.

SEMESTER III (HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic behaviour of individual economic agents

PSO 2: Understand the behaviour of the consumer, producer and competitive firm.

PSO 3: Acquaint with the alternative theories of output and employment determination in a closed economy

PSO 4: Acquaint with the theoretical issues related to an open economy

PSO 5: Understand the basic concepts and terminology related to fundamental statistical analysis and inference.

Course Outcome (CO)

Course Code: ECNHC301

Course Title: Essentials of Microeconomics

Students will be able to learn about:

CO 1: Axioms of Rational Choice, utility, Indifference Curves, Utility Maximization, Indirect Utility Function, Expenditure Minimization

CO 2: Income and Substitution Effects of Price Change, Compensated and ordinary demand curves, choice under risk and inter-temporal choice; revealed preference theory

CO 3: Production Theory: basic concepts, Isoquants, Production with One Variable Input, returns to scale, special cases of production functions, production transformation curve

CO 4: Definition and types of Costs, relationship between short run and long run cost curves, Impact of Economies and diseconomies of scale, Economies of Scope.

CO 5: The nature and behaviour of firms, profit maximization rule; perfect competition: meaning and characteristics, profit maximization and input demand.

Course Code: ECNHC302

Course Title: Essentials of Macroeconomics

Students will be able to learn about:

CO 1: Short run and long run consumption functions, fundamental psychological law of consumption and its implications, theories of consumption

CO 2: Investment function, Marginal efficiency of capital, Investment multiplier, Profit and accelerator theories of investment.

CO 3: Stagflation, Phillips curve, adaptive expectations, rational expectations and policy ineffectiveness debate.

CO 4: Open and closed economy, Mundell-Fleming model, Exchange rate determination

CO 5: Concepts and components of balance of trade and balance of payments, Equilibrium or disequilibrium of balance of payments, Adjustment of balance of payments, International financial market

Course Code: ECNHC303

Course Title: Statistical Methods for Economics

Students will be able to learn about:

CO 1: Arithmetic mean, median and mode, range, quartile deviation, mean deviation and standard deviation, measures of skewness and kurtosis

CO 2: Concepts of Sample Space and Events, Probability of an Event, Probability Theorems, Bayes'Rule, Mathematical Expectation.

CO 3: Concept of a Random Variable, Mathematical Expectation and Its Properties, Binomial distribution, Poisson distribution-its properties, Normal distribution-its properties.

CO 4: Distinction between sampling and census, methods of sampling; testing of hypothesis

CO 5: Covariance, Scatter Diagram, Karl Pearson's coefficient of correlation, Concept of Spearman's Rank Correlation. The Concept of Regression, The coefficient of determination and Standard Error of Estimate.

SEMESTER III (GENERIC ELECTIVE)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

POS 1: Get knowledge about the major trends in economic indicators in India in the post-Independence period

POS 2: Get knowledge about the paradigm shifts and turning points of Indian economy

POS 3: Get knowledge about the theory and functioning of the monetary and financial sectors of the economy.

PSO 4: Understand the concepts, methods and policy options in managing the environment using tools of economic analysis.

Course Outcome (CO)

Course Code: ECNGE3.1

Course Title: Indian Economy I

Students will be able to learn about:

CO 1: Indian Economy on the eve of independence, Alternative development strategies since independence, post-1991 globalization strategies, structural transformation

CO 2: Size and growth rates of population, Population as a factor of economic development, Demographic Dividend, National Population Policy, Human Development in India.

CO 3: Concept and Incidence of Poverty in India, Poverty estimates, Strategy of Poverty Alleviation, Inequality- Income inequality in India, Unemployment, Government policies and measures.

C0 4: India's development experience with high performing Asian economies.

Course Code: ECNGE3.2

Course Title: **Money and Financial Markets**

Students will be able to learn about:

CO 1: Concept, functions, measurement & theories of money supply, money multiplier

CO 2: Role of financial markets and institutions, instruments and financial innovations, financial sector reforms in India, role of financial derivatives financial institutions

CO 3: Stock Market Stock Market and its Operations, Stock Market indices in India, BSE Sensex, NSE Nifty

CO 4: Interest Rates Determination, sources of interest rate differentials, theories of term structure of interest rates; interest rates in India.

CO 5: Meaning and types of Banking System, Functions of commercial banks, Balance sheet and portfolio management, banking sector reforms Central Banking and Monetary Policy, Monetary policy, Monetary management in an open economy, current monetary policy of India

Course Code: ECNGE3.3

Course Title: Environmental Economics

Students will be able to learn about:

CO 1: The economy and the environment inter-linkages, Key environmental issues and problems, externalities, Pareto optimality, market failure, solution to market failure:

CO 2: Economic instruments of environmental policies, implementation of environmental policies in India, international experience and trans-boundary environmental problems, Global Treaties, the Montreal Protocol, economics of climate change.

CO 3: Types and definitions of non-market values, measurement or valuation methods

CO 4: Concepts & Notions of Sustainability, measurement and indicators of sustainability

SEMESTER III (NON-HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand the basic concept of macroeconomics

PSO 2: Understand the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variables

PSO 3: Understand the various theories of determining GDP in the short run

Course Outcome (CO)

Course Code: ECNGC301

Course Title: Principles of Macroeconomics-I

Students will be able to learn about:

CO 1: Nature and scope of macroeconomics; basic macroeconomic issues, major schools of thought in macroeconomics; macroeconomic models; historical performance of the Indian economy; limitations of macroeconomics.

CO 2: Concepts of national income accounting, approaches to measurement of national income, difficulties of estimating national income, circular flow of income

CO 3: The Classical theory of output and employment, the Keynesian theory of output and employment, consumption function; investment function, autonomous expenditure, concept of multiplier

CO 4: Impact of changes in government expenditure and taxes, net exports function, net exports, equilibrium national income

CO 5: Definition and functions of money; monetary aggregates; theories of money, determination of money supply, credit creation, monetary policy

SEMESTER IV (HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Understand about the functioning of the different types of markets and their functioning

PSO 2: Understand about the issues of market imperfection and market failures.

PSO 3: Understand about the long run dynamic issues related to economics.

PSO 4: Understand about the micro-foundations to the various aggregative concepts.

PSO 5: Gather knowledge about the basic econometric concepts and techniques.

Course Outcome (CO)

Course Code: ECNHC401

Course Title: Advanced Microeconomics

Students will be able to learn about:

CO 1: General equilibrium analysis, Equilibrium and efficiency under pure exchange and production, welfare economics, the social welfare function and the theory of second best.

CO 2: Definition and output decision of the monopolists, sources of monopoly, social cost of monopoly power, definitions, characteristics & output decisions of monopolistic competition.

CO 3: Short-run pricing and output decisions of oligopoly, Cartels, price leadership model

CO 4: Concepts, importance and application of game theory, types of game, strategies, concept of Nash equilibrium, threats, commitments, and credibility, entry deterrence

CO 5: Meaning of Externalities, the Coase theorem, Government intervention of public goods, Public goods, Asymmetric information, principal-agent problem, moral hazards, adverse selection, signalling

Course Code: ECNHC402

Course Title: Advanced Macroeconomics

Students will be able to learn about:

CO 1: Concept of consumption function, the consumption puzzle, life-cycle and permanent income hypotheses, investment, the accelerator theory of inventories, q-theory of investment

CO 2: The Accumulation of Capital and Population Growth; The Harrod-Domar model, Instability of equilibrium, The basic Solow model of growth, the Golden rule level of capital, Population growth in the Solow model.

CO 3: Technological progress and the Solow model, Policies to promote Economic Growth, Elements of endogenous growth.

CO 4: The goals of macroeconomic policy, Lags in the effects of macroeconomic policy, Monetary policy objectives and targets, the Government budget constraint, Government debt and Ricardian equivalence, Relative effectiveness of monetary and fiscal policy in IS-LM framework

CO 5: Classicals and full wage-price flexibility, Keynesians and wage-price rigidity, the Monetarist counterrevolution, New-Classical economics and critique of Keynesian economics, Rational expectations and policy ineffective proposition, the Keynesian counter critique, Laffer curve analysis

Course Code: ECNHC403

Course Title: Introductory Econometrics

Students will be able to learn about:

CO 1: Nature and Scope of Econometrics, Economic and Econometric Models, The Aims and Methodology of Econometrics, Statistical Concepts, Probability Distributions, Testing of hypotheses, power of a test

CO 2: Simple linear regression model, stochastic specification, and the principle of ordinary least squares, assumptions under CLRM, blue properties of estimators, goodness of fit, tests of hypotheses, forecasting.

CO 3: Consequences, Detection and Remedies Heteroscedasticity, Sources, consequences, tests of autocorrelation, remedial measures of Autocorrelation.

CO 4: Nature of the problem, Sources, consequences, detection and remedies of Multicollinearity

CO 5: Omission of relevant variables, Inclusion of irrelevant variables, Tests of specification errors, Errors in variables.

SEMESTER IV (GENERIC ELECTIVE)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Get knowledge about the sector-specific polices and their impact in shaping trends in key economic indicators in India.

PSO 2: Understand about the key aspects of Indian economic development during the second half of British colonial rule.

PSO 3: Understand about the government finances with special reference to India.

Course Outcome (CO)

Course Code: ECNGE4.1

Course Title: Indian Economy-II

Students will be able to learn about:

CO 1: Fiscal reform measures in the context of India's New Economic Policy, Fiscal Responsibility and Budget Management (FRBM) Act, Monetary Reforms, Black money and Parallel economy in India, Trade Policy

CO 2: Changing structure of Indian Agriculture, Growth and productivity of Agriculture, Sustainable agriculture, Diversification of Agriculture, Green revolution, Institutions, WTO and Agriculture.

CO 3: Pattern of Industrialization, Industrial growth and productivity in the post reform period, Diversification of industries, Public Sector reforms, Disinvestment and Privatization, MSME Sector, Industrial Policy reforms, Foreign Investment in the Industrial sector.

CO 4: Role of the service sector in the Indian Economy, Growth in and composition of the service sector, Composition and direction of foreign trade, Balance of payments position, Trade in services and WTO.

Course Code: ECNGE4.2

Course Title: Economic History of India (1857-1947)

Students will be able to learn about:

CO 1: Economic structure and policies of pre-independence era, the socio-cultural attitudes and India's economic backwardness, drain theory, economic ideas of Ranade and Gandhi

CO 2: Trend and composition of national income, population growth, age structure and sex composition, changing occupational structure, urbanisation, and poverty

CO 3: Agrarian structure and land relations, agricultural markets and institutions, commercialization of agriculture, trends in performance and productivity of agriculture, emergence of agricultural labour, food problem and policies, partition and its impact on agriculture.

CO 4: The state of industrial development in mid-nineteenth century india, the de-industrialization thesis, nature of industrialisation in the interwar period, constraints to industrial breakthrough, partition and its impact on industrial sector, transportation development and its impact

CO 5: The imperial priorities, foreign capital in colonial india, foreign trade-growth and composition, the nature and problem of public debt, economic drain from india, government and fiscal policy.

Course Code: ECNGE4.3

Course Title: Public Finance

Students will be able to learn about:

CO 1: Meaning and scope of public finance, normative approach to public finance, welfare economics and government intervention, concept of market failure

CO 2: Meaning and characteristics of Public Goods, The Free Rider Problem, The Lindahl Equilibrium, Samuelson's theory of Public Expenditure.

CO 3: Meaning and types of externalities, corrective taxes and subsidies, pollution permits, regulation and direct control, the Coase Theorem

CO 4: Shifting and incidence of tax, demand and supply theory of incidence, incidence of product taxes under perfect competition and monopoly, incidence of factor taxes under perfect competition and monopoly, excess burden of tax

CO 5: Working of Monetary and Fiscal Policies, Current Issues of India's Tax System, Analysis of Budget and Deficits, Fiscal Federalism in India, State and Local Finances

SEMESTER IV (NON HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Get knowledge about the theories of determination of National Income

PSO 2: Understand about the key concepts of inflation and unemployment

PSO 3: Understand about the basic concepts in an open economy

Course Outcome (CO)

Course Code: ECNGC401

Course Title: Principles of Macroeconomics-II

Students will be able to learn about:

CO 1: The goods market and the IS curve, Fiscal policy multipliers, Money market and the LM curve, the Monetary policy multiplier, Determination of Equilibrium income and interest rate

CO 2: Aggregate demand curve, the Aggregate supply curve, Determination of the Aggregate Price Level, Stabilisation policy, Shocks to aggregate demand and aggregate supply

CO 3: Definition and types of Inflation, Determinants of inflation, Theories of inflation, Costs of inflation, Unemployment and its types of Okun's law, Phillips Curve in short run and long run.

CO 4: International trade and the macro economy, theories of international trade, trade barriers, free trade argument vs. protectionism debate.

CO 5: Concepts and components of balance of trade and balance of payments, Basic accounting rule, Equilibrium or disequilibrium of balance of payments, foreign exchange, Determination of exchange rate, Effects of trade policies on exchange rate

SEMESTER V (HONOURS)

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Gather knowledge about the major trends in economic indicators in India in the post-Independence period.

PSO 2: Know about the paradigm shifts and turning points in the Indian Economy.

PSO 3: Understand the alternative conceptions of development.

PSO 4: Gather knowledge about models of growth and development, inequality as well as about the role of state towards development of an economy.

PSO 5: Understand the theories and functioning of the monetary and financial sectors of the economy.

PSO 6: Gather knowledge about the instruments of monetary control with special reference to India.

PSO 7: Understand about the nature of government intervention and its implications for allocation, distribution and stabilization.

PSO 8: Gather knowledge about the theory of public economics and about the Indian public finances.

PSO 9: Understand the microeconomic framework to analyze individual choice in the demand for health and education, government intervention and aspects of inequity and discrimination in both sectors, including the overview of health and education in India.

PSO 10: Cater the foundation of applied econometrics and develop skills required for empirical research in economics.

PSO 11: Examine the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule.

PSO 12: Get introduced with the basic concepts of game theory that helps them in solving simple problems.

Course Outcome (CO)

Course Code: ECNHDSE501

Course Title: Economics of Health and Education

Students will be able to learn about:

CO1: Role of health in human development

CO2: Microeconomic foundations of health economics

CO3: Evaluation of health programs, cost effectiveness and cost-benefit analysis of investment on health, measurement of disease burden

CO4: Health sector in India including health outcomes; health care delivery systems and health financing

CO5: Investment in human capital, gender and caste discrimination in India.

Course Code: ECNHDSE502

Course Title: Applied Econometrics

Students will be able to learn about:

CO1: Tools and techniques of empirical econometric research such as sources of data, modelling of economic data; model selection criteria; hypothesis formulation etc.; interpretation of the disturbance term.

CO2: Dynamic econometric models, specially, the autoregressive and distributed lag models.

CO3: Simultaneous equation models

CO4: Panel Data Models

CO5: Econometric software packages for data entry, data representation and analysis.

Course Code: ECNHDSE503

Course Title: Economic History of India (1857-1947)

Students will be able to learn about:

CO1: An Overview of economic structure and policies of pre-independence era

CO2: Macroeconomic trends of National income, population, age-sex composition, occupational structure, urbanisation and poverty.

CO3: Agrarian structure and land relations which includes agricultural markets and institutions, land systems, rural indebtedness, food problem and policies

CO4: Industrial development and the transportation sector.

CO5: Economy and state in the imperial Context

Course Code: ECNHDSE504

Course Title: Game Theory

Students will be able to learn about:

CO1: Normal form games- dominant and dominated strategies, dominance solvability, mixed strategies, Nash equilibrium

CO2: Solution of the games- pure and mixed strategies

CO3: Application of game theory in Cournot Duopoly model, Bertrand model, The Commons Problem, Prisoner's Dilemma, Nash equilibrium, Natural Monopoly and Bankruptcy laws

CO4: The game tree; strategies; sub game perfection; backward induction in finite games; Commitment; bargaining and other applications

Course Code: ECNHDSE505

Course Title: Money and Financial Markets

Students will be able to learn about:

CO1: Concept of money and its functions, measurement; and theories of money supply determination

CO2: Financial Institutions, Markets, Instruments and Financial Innovations

CO3: Stock Market and its Operations

CO4: Interest rates determination and the theories of term structure of interest rates

CO5: Meaning and functions of commercial banks and central banks, monetary policies.

Course Code: ECNHDSE506
Course Title: Public Economics
Students will be able to learn about:

CO1: Meaning and Scope of Public Economics

CO2: Meaning and characteristics of Public Goods, theories of efficient allocation of Public Goods

CO3: Meaning and type of externalities, market failure, internalization of externalities

CO4: Tax and non tax revenue and the economic effects of taxation, Principles of Taxation Incidence of taxation

CO5: Indian Public Finance including India's tax System and major tax reforms since 1991

SEMESTER V (NON- HONOURS)

After completion of the course the students will be able to:

PSO1: Understand the major trends in aggregate economic indicators in India.

PSO2: Get an exposure to the theories and functioning of the monetary and financial sectors of the economy.

PSO3: Understand the concepts, methods and policy options in managing the environment using the tools of economic analysis.

PSO 4: Examine the sector-specific trends in key indicators and their implications in the post-Independence period.

PSO5: Analyse key aspects of Indian economic development during the second half of British colonial rule.

PSO6: Get an overview of government finances with special reference to India.

PSO7: Understand the basic principles of microeconomic theory.

PSO8: introduce the students to the basic concepts of Macroeconomics including the concepts of determination and measurement of aggregate macroeconomic variables.

Course Code: ECNGDSE1

Course Title: Economic Development and Policy in India–I

Students will be able to learn about:

CO1: Issues in Growth, Development and Sustainability

CO2: The importance of Natural Resources, Human Resources, Capital, Technology, organizational and Institutional framework with economic development.

CO3: Population and Economic Development

CO4: Occupational structure/employment in the organized and the unorganized sectors.

CO5: Indian Development Experience.

Course Code: ECNGDSE2

Course Title: Money and Banking

Students will be able to learn about:

CO1: Concept of money and its functions, measurement; and theories of money supply determination

CO2: Financial Institutions, Markets, Instruments and Financial Innovations

CO3: Stock Market and its Operations

CO4: Interest rates determination and the theories of term structure of interest rates

CO5: Meaning and functions of commercial banks and central banks, monetary policies.

Course Code: ECNGDSE3

Course Title: Environmental Economics

Students will be able to learn about:

CO1: The inter-linkages between the economy and the environment.

CO2: The Design and Implementation of Environmental Policy

CO3: Environmental Valuation Methods and Applications

CO4: Concepts of Sustainability, measurement and indicators of sustainability

Program Specific Outcome (PSO)

After completion of the course the students will be able to:

PSO 1: Examine sector-specific polices and their impact in shaping trends in key economic indicators in India.

PSO 2: Analyze the emerging issues of Indian Economy.

PSO 3: Understand basic demographic concepts and their evolution during the process of development.

PSO 4: Understand the governance of communities and organizations and linked to sustainable growth.

PSO 5: Analyze the reflections on the role of globalization and increased international dependence on the process of development.

PSO 6: Understand basic corporate finance

PSO 7: Understand the causes of environmental problems and economic implications of environmental policy

PSO 8: Explain the composition, direction, and consequences of international trade.

PSO 9: Explain the determinants and effects of trade policy.

PSO 9: Build on the models of open economy macroeconomics, focusing on national policies as well as international monetary systems.

PSO 10: Explain the causes and consequences of the rapid expansion of international financial flows in recent years.

PSO-10: Expose to real-world examples and case studies.

PSO 11: Acquaint about the current issues of the economy of North-East India

PSO 12: Acquaint the learners with the historical developments in the economic thoughts propounded by different schools.

Course Outcome (CO)

Course Code: ECNHC601

Course Title: Indian Economy- II

Students will be able to learn about:

CO 1: Macroeconomic Policies and Their Impact Fiscal reform measures in the context of India's New Economic Policy, Fiscal Responsibility and Budget Management (FRBM) Act, Monetary

Reforms and its impact, Black money and Parallel economy in India- consequences and corrective government intervention, Trade Policy- Export Import Policy, Foreign Trade Policy; Current and Capital Account Convertibility .

CO 2: Changing structure of Indian Agriculture, Growth and productivity of Agriculture, Sustainable agriculture- concept and constraints, Diversification of Agriculture, Capital formation, Role of technology; Green revolution; Institutions- land reforms, rural credit, agricultural marketing, price policy; WTO and Agriculture

CO 3: Pattern of Industrialization, Industrial growth and productivity in the post reform period, Diversification of industries, Public Sector reforms, Disinvestment and Privatization, MSME Sector, Industrial Policy reforms, Foreign Investment in the Industrial sector.

CO 4: Role of the service sector in the Indian Economy, Growth in and composition of the service sector; Composition and direction of foreign trade, Trend in merchandise trade and invisibles, Balance of payments position- Pre and Post Reform period, Trade in services and WTO.

Course Code: ECNHC602
Course Title: Development Economics-II

Students will learn about -

CO 1: Demographic concepts; birth and death rates, age structure, fertility and mortality; Demographic transitions during the process of development; Population and economic development, connections between income, mortality, fertility choices and human capital accumulation; Migration

CO 2: The distribution of land ownership; land reform and its effects on productivity; contractual relationships between tenants and landlords; land acquisition; nutrition and labor productivity; informational problems and credit contracts; microfinance; inter- linkages between rural factor markets

CO 3: The economic functions of Community; Collective intervention in Rural economies: Management of Common Property Resources; Overcoming the community failure

CO 4: Environment- Economy linkage; Concept and indicators of sustainable development;

Common-pool resources; Environmental externalities and state regulation of the environment;

Economic activity and climate change

CO 5 **:** International Trade: A Stimulus or a Hindrance To Growth; The Prebisch-Singer Thesis; trade, production patterns and world inequality; Economic arguments for multilateral agreements;

Role of Foreign Capital and Foreign Aid in Economic Development; Financial instability in a globalized world

Course Code: ECNHDSE601

Course Title: Financial Economics

Students will learn about -

CO 1: Basic theory of interest, discounting and present value, internal rate of return, evaluation criteria; fixed-income securities; bond prices and yields; interest rate sensitivity and duration; immunisation; the term structure of interest rates; yield curves; spot rates and forward rates

CO 2: Random asset returns; portfolios of assets; portfolio mean and variance; feasible combinations of mean and variance. Mean-variance portfolio analysis: the Markowitz model and the two-fund theorem; risk-free assets and the one-fund theorem.

CO 3: The Cost of Capital: Debt and equity; Cost of Debt, Cost of Preference Capital and Equity Capital. The capital market line; the capital asset pricing model; the beta of an asset and of a portfolio; security market line; use of the CAPM model in investment analysis and as a pricing formula.

CO 4: Options and Derivatives: An introduction to financial derivatives: Types and uses of derivatives; Forward Contracts: Relation between Spot and Future Prices, forward vs future contract, Hedging in Futures; Options: types, value of an option, the Pay-Offs from Buying and Selling of Options.

CO 5: Corporate Finance: Corporate Financing: Meaning and its Patterns ; common stock; debt; preferences; convertibles.

Course Code: ECNHDSE602

Course Title: Environmental Economics

Students will learn about -

CO 1: Ecology, Environment and Economy, environmental economics, Environmental economics and Resource economics, Environment and Development trade off, Kuznet curve, Pareto optimality, Public good and Private good, Common property resources, Private and Social cost

CO 3: Meaning and types of externality, Pareto optimality and market failure, solution to market failure, Coase theorem

CO 3: Environmental Policies, Economic instruments of environmental policies, Sustainable Development, Measurement and indicators of sustainability, The Pearce–Atkinson indicator

CO 4: Trans-boundary environmental problems, Global warming, Ozone layer depletion, economics of climate change, trade and environment, Pollution Haven Hypothesis, Global intervention for sustainable development

CO 5: Types and definitions of non-market values, Contingent valuation and Travel cost methods

Course Code: ECNHDSE603

Course Title: International Economics

Students will learn about -

CO 1: The subject matter of International Economics and Trade Theories-Adam Smith's absolute advantage theory, Ricardian law of comparative advantage; Reciprocal demand and Offer curve analysis; Heckscher-Ohlin theorem and The Specific factors model.

CO 2: International capital flows, significance and limitations of foreign capital, Foreign portfolio investment; Foreign direct investment, factors affecting direct investment, effects of direct investment; Firms in the global economy — outsourcing and multinational enterprises.

CO 3: Trade Policy- Free trade Vs. protective trade; Political economy of protectionism; Methods of protection - Tariff and non-tariff barriers; Inward looking trade policy and outward looking trade policy and their evaluation.

CO 4: Exchange Rate: Concept of exchange rate, cross exchange rate, spot and forward exchange rates; Demand for and Supply of foreign exchange, Determination of equilibrium Exchange Rate; Fixed and flexible exchange rate systems – Case for and against fixed and flexible exchange rate systems.

CO 5: International Monetary System: Gold Standard, Inter-war period, Bretton Woods System, Managed floating standard; International Institutions: International Monetary Fund (IMF) - Objectives, functions, achievements and failures; WTO – Objectives, major agreements; Globalization – Meaning and essential conditions for globalization; Challenges of globalization, Financial globalization and financial crises.

Course Code: ECNHDSE604

Course Title: The Economy of North-East India

Students will learn about -

CO 1: Resources of the Region– Mineral, Forest and Water resources, Human resources – Trends in population growth, Composition of population, Distribution of the population, Population density, Migration of population, Urbanisation, Occupational distribution.

CO 2 : Trends and Pattern of Production – Land use, Agricultural holdings and Cropping pattern, Food production and Food security, Horticulture, Sericulture, Jhum Cultivation, Modernisation of agriculture, Sustainable agriculture.

CO 3: Problems and prospects of Industrial development of NE region, Organised Industries - Role of Tea, Oil and Coal industries; Micro, small and medium industries, Food Processing, Handloom and handicrafts; Tourism.

CO 4: Economic Infrastructure of the region – Roadways, Railways, Waterways, Airways; Communication; Energy Sector; Financial Institutions; The Role of North Eastern Council; Social Infrastructures- Education and Health.

CO 5: Human Resource Development – Poverty and Unemployment; Flood and erosion problem, Problems of Agricultural labourers – disguised unemployment; Border Area Development. Act East policy

Course Code: ECNHDSE605
Course Title: History of Economic Thought

Students will learn about -

CO 1: Pre-Classical and Classical Economic Thought: Basic tenets of Mercantilism and Physiocracy: Contributions of Adam Smith, David Ricardo, T.R. Malthus, J.B. Say, J.S. Mill's Restatement of Classicism.

CO 2: Positive and Critical ideas of the Historical School; State Socialism – Ideas of J.K. Rodbertus and F. Lassalle; Scientific Socialism- Chief, tenets of Marxian Thought, Dialectical Materialism, The Labour Theory of Value, Theory of Surplus Value, The Law of Concentration of Capital; Marx and Modern Economists.

CO 3: Subjectivism and Marginalism – Factors giving rise to Subjectivism and Marginalism, Economic ideas of Walras and Carl Menger; Neo-Classicism – Contributions of Alfred Marshall, Knut Wicksell and Bohm Bawerk.

CO 4: Keynes' Departure from Classical Economics, Salient Features of the General Theory of Employment, Interest and Money, Theory of Employment, Theory of Prices, Keynes and

International Economics, Keynes" Influence on Public Policy, Keynesian Economics and Underdeveloped Countries; Keynesianism Vs. Monetarism.

CO 5: Development of Indian Economic Thought; Economic ideas of Kautilya, D. Naoroji, M. Gandhi, D.R. Gadgil, Gyan Chand.

SEMESTER VI (NON-HONOURS)

Program Specific Outcome (PSO)

To enable the students to

PSO 1: analyse trends in the Indian Economy offered in Economic Development and Policy–I,

PSO 2: examine sector-specific trends in key indicators and their implications in the post-Independence period.

PSO-03: analyse key aspects of Indian economic development during the second half of British colonial rule.

PSO 4: investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule.

PSO 4: understand India's economic development after independence in 1947.

PSO 5: understand overview of government finances with special reference to India.

PSO 6: analyse efficiency and equity aspects of taxation of the centre, states and the local governments and the issues of fiscal federalism and decentralisation in India.

Course Code: ECNGDSE4

Course Title: Economic Development and Policy in India–II

Students will learn about

CO 1: Changing structure of Indian Agriculture, Growth and productivity of Agriculture, Sustainable agriculture concept and constraints, Diversification of Agriculture, Capital formation, Role of technology, Institutions- land reforms, rural credit, agricultural marketing, price policy; Regional Variations.

CO 2: Industry: Policies and Performance Pattern of Industrialization, Trends in Industrial Production, Performance of Public Sector, Disinvestment and Privatization, MSME Sector, Foreign Investment in the Industrial sector.

CO 3: Foreign Trade: Trends and Policies Salient features of India's Foreign trade, Composition and direction of foreign trade, Trend in merchandise trade and invisibles, Balance of payments position

Pre and Post Reform period, Trade Policy- Export Import Policy, Foreign Trade Policy, India and the World Trade Organisation

Course Code: ECNGDSE5

Course Title: Economic History of India (1857- 1947)

Students will learn about

CO 1: An Overview of economic structure and policies of pre independence era, the laws of inheritance; socio-cultural attitudes and India's economic backwardness; drain theory; economic ideas of Ranade and Gandhi.

CO 2: National Income – trend and composition; Population – growth, age structure and sex composition; Changing occupational structure; urbanisation; Poverty

CO 3: Agrarian structure and land relations; agricultural markets and institutions – credit and irrigation; Land systems; Commercialization of agriculture- its causes and consequences; trends in performance and productivity; problem of rural indebtedness; Emergence of agricultural labour as category; famines; Evolution of the Food Problem and policies; Partition and its impact on agriculture.

CO 4: The state of industrial development in mid-nineteenth century India, the de-industrialization thesis –its statement and validity, emergence of modern capitalist industrial enterprise in India; nature of industrialisation in the interwar period; constraints to industrial breakthrough; labour relations and evolution of labour legislations and organisations; Partition and its impact on industrial sector. Transportation development and its impact – Railways, roads, shipping.

CO 5: The imperial priorities and the Indian economy - ‗guided underdevelopment' of India under the British rule; Foreign capital in Colonial India – its extent and impact; foreign-trade-growth and composition; evolution of provincial finance, the nature and problem of public debt; Economic drain from India -form, extent and consequences; government and fiscal policy.

Course Code: ECNGDSE6

Course Title: Public Finance

Students will learn about

CO 1: Public Finance: Meaning and Scope, Normative Approach to Public Finance- Allocation, Distribution and Stabilization function of government, Welfare Economics and Government Intervention- Pareto Efficiency, Equity vs. Efficiency, Concept of Market Failure.

CO 2: Public Goods- Meaning and characteristics, Public Goods and Market Failure, Pure and Impure Public Goods, The Free Rider Problem, Efficient Allocation of Public GoodsThe Lindahl Equilibrium, Samuelson's theory of Public Expenditure.

CO 3: Meaning and types of Externalities and Market Failure, Internationalization of Externalities, Corrective taxes and Subsidies, Pollution Permits, Regulation and Direct Control, Assignment of Property Rights- The Coase Theorem.

CO 4: Concept of shifting and Incidence, Forward and Backward Shifting, The Demand and supply theory of Incidence, Modern concept of Incidence; Incidence of Product taxes (Specific tax and Lump Sum Tax) under Perfect Competition and Monopoly, Incidence of Factor taxes under Perfect Competition and Monopoly; Excess Burden of Tax: Meaning and Types.

CO 5: Working of Monetary and Fiscal Policies, Current Issues of India's Tax System, Analysis of Budget and Deficits, Fiscal Federalism in India, State and Local Finances.

SEMESTER VI (NON-HONOURS)
GENERIC ELECTIVE

Programme specific outcome (PSO)

To enable the students to

PSO 1: understand the basic concepts of Macroeconomics.

PSO 2: understand the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Course Outcome:

Course Code: ECNGE2

Course Title: Introductory Macroeconomics

Students will learn about

CO 1: Macro vs. Micro Economics; Scope and limitations of Macroeconomics; Introduction to National Income - Concepts of GDP, GNP, NDP and NNP at market price and factor cost; Personal Income and Disposable personal Income; Real versus Nominal GDP, GDP Deflator. GDP and Welfare; Limitation of the GDP concept as a measure of welfare.

CO 2: Income, expenditure, product and Value added approaches, Difficulties of Estimating National Income, Circular Flow of Income and expenditure in two and four-sector economy; national income accounting for an open economy.

CO 3: Definition and Functions of money; quantity theory of money – cash transactions and cash balance approaches, Friedman's restatement of the quantity theory; Demand for Money – Classical,

Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications; Determination of money supply; credit creation; monetary policy – meaning, objectives and tools.

CO 4: Meaning, types, causes and effects; demand-pull and cost-push inflation; Inflationary gap; Deflation – meaning, effects; Inflation Vs. deflation; Hyperinflation – causes of hyperinflation, costs of hyperinflation; Anti-Inflationary Measures - Monetary policy and Fiscal policy.

CO 5: Say's Law, Theory of Determination of Income and Employment; Keynesian systems- Simple Keynesian model of income determination; Aggregate Demand and Aggregate Supply, equilibrium aggregate output; Product market and the IS curve, Money Market and the LM curve, Determination of Equilibrium income and interest rate: the IS-LM model; fiscal and monetary multipliers.

PROGRAMME SPECIFIC OUTCOME (PSO) & COURSE OUTCOME (CO)

DEPARTMENT OF EDUCATION, GARGAON COLLEGE

B.A 1ST SEMESTER (HONOURS COURSE)

COURSE OUTCOME (CO):

On completion of the course the student will understand the concept of education and its role in individual and social development. The students will learn the basic tenants of Indian and Western philosophies and their contribution in the domain of education. Students will be able to learn about different theories of educational sociology and the relationship between education and sociology. The Students will learn about different socialization process and also about the role of education in social mobility, national and emotional integration and in international understanding. Students will be able to understand the relation between education & social change, education and cultural changes, education and economic development and role of education in Human Resource Development.

PROGRAMME SPECIFIC OUTCOME (PSO):

COURSE CODE: EDNH101: PHILOSOPHICAL FOUNDATIONS OF EDUCATION (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Describe the modern concept, aims, functions and role of education

PSO-2: Describe the role of Philosophy in Education

PSO-3: Explain the basic tenants of the given Indian and Western Philosophies and their influence in Education.

PSO-4: Appraise the contribution of the given philosophers in the domain of education

COURSE CODE: EDNH102: SOCIOLOGICAL FOUNDATIONS OF EDUCATION (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the concept, approaches and theories of educational sociology.

PSO-2: Illustrate Social Aspects, Social Processes and role of Education.

PSO-3: Explain the role of Education in Social Change and Development.

PSO-4: Describe various Social Groups and their Education

PSO-5: Explain different Political Ideologies and their bearings on Education

B.A 1ST SEMESTER (NON-HONOURS COURSE)

COURSE OUTCOME (CO): On completion of the course the student will understand the concept of education and its role in individual and social development. The students will learn the basic tenants of Indian and Western philosophies and their contribution in the domain of education. The student will also understand the concept of curricular and co-curricular activities..

PROGRAMME SPECIFIC OUTCOME (PSO):

COURSE CODE: EDCN101: PHILOSOPHICAL FOUNDATIONS OF EDUCATION (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Describe the modern concept, aims, functions and role of education.

PSO-2: Describe the role of Philosophy in Education.

PSO-3: Enable the students to understand the basic tenants of the given Indian and Western Philosophies and their influence in Education.

PSO-4: Appraise the contribution of the given philosophers in the domain of education.

B.A 1^(ST) SEMESTER (GENERIC ELECTIVE (GE)-I COURSE)

COURSE OUTCOME (CO):

The student will be able to understand the importance of value education in the 21^(st) century and how to inculcate these values through education The Students will be able to learn about meaning, concept, objectives and pedagogy of peace

PROGRAMME SPECIFIC OUTCOME

COURSE CODE: GEED102: VALUE EDUCATION (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the concepts of values and value education.

PSO-2: Describe the importance of value education in the 21st century.

PSO-3: Describe the need of values in creating a better world.

PSO-4: Explain the promotion of value through education.

B.A ^(2nd) SEMESTER (HONOURS COURSE)

COURSE OUTCOME (CO): The student will be able to understand the application of psychology in education. The student will learn about the concept and theories of learning, intelligence, creativity and personality. The student will understand the concept and processes of mental health and mental hygiene. The student will learn about educational management and administration. The student will understand about the development of educational institution through proper leadership, through proper planning and also through proper supervision and inspection. The student will understand the various sources of educational finance and management of educational finance.

PROGRAMME SPECIFIC OUTCOME;

COURSE CODE: EDCN201: PSYCHOLOGICAL FOUNDATIONS OF EDUCATION (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the concept, nature, scope and uses of psychology in Education.

PSO-2: Explain the influence of growth and development in education.

PSO-3: Describe the meaning, concept, variables, types and theories of learning.

PSO-4: Discuss the concept and theories of intelligence and creativity.

PSO-5: Discuss the concept and theories of intelligence and creativity.

PSO-6: Explain the meaning, concept, factors and theories of personality explain the meaning, concept, factors and theories of personality.

PSO-7: Describe the concepts of mental health and mental hygiene, measures of mental health in school

COURSE CODE: EDNH202: EDUCATIONAL ADMINISTRATION AND MANAGEMENT (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the define the concept of Educational Management

PSO-2: Describe the types of management and modern trends of Educational management.

PSO-3: Define the concept of educational leadership

PSO-4: Define the concept of educational leadership explain the principles of educational leadership.

PSO-5: Describe the styles of leadership and its implication in educational leadership.

PSO-6: Define the concept of educational planning and its importance.

PSO-7: Analyze the role and importance of educational supervision

PSO-8: Suggest measures to ensure quality in educational management

B.A 2nd SEMESTER (NON-HONOURS COURSE)

COURSE OUTCOME (CO):

The student will be able to understand the application of psychology in education. The student will learn about the concept and theories of learning, intelligence, creativity and personality. The student will understand the concept and processes of mental health and mental hygiene.

COURSE CODE: EDCN201: PSYCHOLOGICAL FOUNDATIONS OF EDUCATION (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the concept, nature, scope and uses of psychology in Education.

PSO-2: Explain the influence of growth and development in education.

PSO-3: Describe the meaning, concept, variables, types and theories of learning.

PSO-4: Discuss the concept and theories of intelligence and creativity.

PSO-5: Discuss the concept and theories of intelligence and creativity.

PSO-6: Explain the meaning, concept, factors and theories of personality explain the meaning, concept, factors and theories of personality.

PSO-7: Describe the concepts of mental health and mental hygiene, measures of mental health in school

B.A 2nd SEMESTER (GENERIC ELECTIVE (GE)-II COURSE)

COURSE OUTCOME (CO):

The student will understand the concept of sex and gender, Patriarchal and Matriarchal, Gender segregation, Gender stereotyping, Gender biases Gender socialization etc.The student will

understand the issues related to gender inequality in school. The student will learn about laws, articles and policies to bring gender equality.

PROGRAMME SPECIFIC OUTCOME

COURSE CODE: GEED202: GENDER AND EDUCATION   (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the meaning and nature of gender and its related terms.

PSO-2: Describe the gender biases and gender inequality in family, school and society.

PSO-3: Describe the gender issues related to school education.

PSO-4: Analyse the laws and policies related to gender equality.

B.A 3rd SEMESTER (HONOURS COURSE)

COURSE OUTCOME (CO):

On completion of the course the Students will come to about the thoughts of Indian and western philosophers, their contribution to the field of education and the relevance of their philosophical thoughts in present education system. The student will learn about psychological tests and the various tools of measuring intelligence, personality, aptitude. The student will learn about the application of Statistics in Measurement and Evaluation in Education. The students will also acquire practical knowledge of conducting psychological Experiments.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: EDNH 301: GREAT EDUCATORS AND EDUCATIONAL THOUGHTS (CREDIT 6)

On completion of the course, the students will be able to -

PSO-1: Appraise the contribution of the given philosophers in the domain of education

PSO-2: Justify the relevance of the educational thought of the given philosophers

COURSE CODE: EDNH 302: MEASUREMENT AND EVALUATION IN EDUCATION (CREDIT 6)

On completion of the course, the students will be able to -

PSO-1: Explain the meaning, nature, scope, need and types of measurement and evaluation in education.

PSO-2: Describe the meaning of psychological tests, their characteristics and process of construction.

PSO-3: Describe some specific tools to measure achievement, intelligence, personality and aptitude.

PSO-4: Describe the meaning and nature of different statistical measures.

PSO-5: Use statistics in measurement and evaluation in education

COURSE CODE: EDNH 303: EXPERIMENTAL PSYCHOLOGY AND LABORATORY PRACTICAL

On completion of the course, the students will be able to -

PSO-1: Explain the concept, scope and need of Experimental psychology.

PSO-2: conduct and report of psychological experiments.

PSO-3: Describe the meaning and nature of memory, immediate memory, memory span and its related practical.

PSO-4: Explain the concept of attention, span of attention and its related practical.

PSO-5: Explain the concept, theories and methods of learning and its related practical.

PSO-6: State the concept of personality, different techniques of personality testing and its related practical.

PSO-7 State the concept of intelligence, historical background of intelligence testing and its related practical.

B.A 3rd SEMESTER (NON-HONOURS COURSE)

COURSE OUTCOME (CO):

The students will be able to understand the Concept, Approaches and Theories of Educational Sociology .The student will understand about different Social Processes.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: EDCN301: SOCIOLOGICAL FOUNDATIONS OF EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to

PSO-1-: Explain the concept, approaches and theories of educational sociology.

PSO-2-: Illustrate Social Aspects, Social Processes and role of Education.

PSO-3-: Explain the role of Education in Social Change and Development.

PSO-4-: Describe various Social Groups and their Education

B.A ^{3rd} SEMESTER (GENERIC ELECTIVE (GE)-III COURSE)

COURSE OUTCOME (CO):

The students will be able to understand the need and importance of Mental Health and Hygiene in the emerging society and different Mental Health Issues. The student will understand the concept of Positive Psychology and the need of integrating yoga in their day to day life for holistic health.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: GEED 302: MENTAL HEALTH EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Explain the need and importance of understanding the concepts of mental health and hygiene in the emerging society.

PSO-2-: Empathize with people having psychological and maladjustment problems.

PSO-3-: Describe the role of different agencies of society and their impacts on the development of an individual's personality.

PSO-4-: describe the various components of positive psychology and its significance in the teaching learning processes.

PSO-4-: integrate yoga in their day-to-day lives for holistic health.

B.A 4th SEMESTER (HONOURS COURSE)

COURSE OUTCOME (CO):

The student will be able to understand concept of education in the context of Indian heritage from Vedic period and will be able to critically examine the education system in Medieval India. They will be able to apply the knowledge of technology in the field of education. The student will learn the skills of effective communication. The students will get practical experience of different skills of micro and macro teaching

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: EDNH 401: EDUCATION IN PRE-INDEPENDENT INDIA

(CREDIT 6)

On completion of the course, the students will be able to -

PSO-1: Recount the concept of education in the context of Indian heritage.

PSO-2: Describe the education in ancient India, particularly Vedic Education and Buddhist Education.

PSO-3: Critically examine the education system in Medieval India.

PSO-4: Evaluate the education system during British period with special emphasis on the commissions and committees.

COURSE CODE: EDNH 402: PART A: TECHNIQUES OF TEACHING (CREDIT 4)

On completion of the course, the students will be able to -

PSO-1: Explain the meaning and nature of teaching.

PSO-2: Describe the principles of teaching and learning.

PSO-3: Describe the role of teacher at different phases of teaching.

PSO-4: Explain the importance of planning lessons in teaching-learning process.

PSO-5: Describe the concept of teaching skills and the stages of microteaching cycle.

PSO-6: State the objectives of teaching different subjects in Elementary and Secondary levels.

PSO-7: Describe different methods and approaches of teaching.

COURSE CODE: EDNH 402: PART B: TEACHING PRACTICE (CREDIT 2)

On completion of the course, the students will be able to -

PSO-1: Demonstrate a few teaching skills in classroom.

PSO-2: Integrate the teaching skills in real classroom situations.

PSO-3: Prepare lesson plans for Microteaching and Practice teaching.

COURSE CODE: EDNH 403: EDUCATIONAL TECHNOLOGY (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1: Describe the concept, nature and components of Educational Technology

PSO-2: Distinguish between Educational technology and Instructional Technology

PSO-3: Apply ICT in teaching learning

PSO-4: Describe the concept, components and characteristics of communication

PSO-5: Demonstrate the skills of effective communication

PSO-6: Apply Models of teaching, personalized system of instruction, programmed learning in teaching learning.

B.A 4th SEMESTER (NON-HONOURS COURSE)

COURSE OUTCOME (CO):

The Students will learn about the Constitutional Provision for Education and Emerging Trends in Education in India. The student will be able to understand the Challenges of Indian Education at different level and the processes of overcoming those challenges.

PROGRAMME SPECIFIC OUTCOME (PSO)

EDCN401: EMERGING TRENDS IN INDIAN EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to

PSO-1- Explain the need of constitutional provisions for education, and the role of constitution in equalizing educational opportunities in the diverse Indian Society.

PSO-2: Identify and explain the challenges of Indian education at different levels.

PSO-3-: Suggest measures to overcome the challenges of Indian education system.

PSO-4-: Define the new perspectives of education such as Environmental education, Inclusive education, Gender education, Inclusive education, Adult education, Human right education, Value education, population education etc.

PSO-5-: Critically examine the initiative taken by government of India in encounter the challenges of the new perspectives of education

PSO-6-: Evaluate various plans and policies regarding the educational set up in India.

PSO-7-: Explain the political influences on the national education system.

PSO-8- Analyze the role of international agencies in development of education

B.A ^{4th} SEMESTER (GENERIC ELECTIVE (GE)-IV COURSE)

COURSE OUTCOME (CO):

The student will be able to understand the relationship between Economics and Education. The student will be able to understand the concept investment and cost in education. The student will be able to understand the need and importance of educational planning for economic development.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: GEED 401: ECONOMICS OF EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Describe the meaning, scope and importance of Economics of Education.

PSO-2-: Define and illustrate the concepts used in economics of Education.

PSO-3-: Examine the historical development of Economics of Education.

PSO-4-: Explain the concept of Education as a good, demand and supply of education, Utility of Education etc.

PSO-5-: Explain the concept of investment in education, return on investment in education, education as production process etc.

PSO-6-: Explain the concepts of different types of Educational cost.

PSO-7-: Examine the concepts of human capital formation, Education financing, Educational Planning etc.

B.A 5th SEMESTER (HONOURS COURSE)

COURSE OUTCOME (CO):

The Students will come to know about the Educational Scenario in post independence India. The student will understand the merits and demerits of educational system of different countries of the world. They will be able to compare the educational system of different countries of the world on the basis of objectives, organization, curriculum and administration. The students will be able to understand importance of values in human society creating a better world and how to promote these values through education. The student will understand the need and importance of good mental health and hygiene in human life and society and how to achieve good mental health through education.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: EDNH 501: EDUCATION IN POST INDEPENDET INDIA

(CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1: Re-count the Educational Scenario at the time of independence.

PSO-2: Elaborate the status of education during post-independence period with special emphasis on the commissions and committees

PSO-3: Acquaint with the recent Educational Development in India.

COURSE CODE: EDNH 502: EDUCATION IN WORLD PERSPECTIVE (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1: Explain the meaning and definition, Nature, Scope and purpose of comparative education

PSO-2: Describe the factors influencing in national system of education

PSO-3: Describe the methods of comparative education

PSO-4: Explain the organization, administration, objectives and examination system of the countries

PSO-5: Describe the vocational and teacher education of different countries, specially U.K, U.S.A, India and Japan

PSO-6: Explain the open education in world perspective

COURSE CODE: DSEED 502: VALUE EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Describe values education and values.

PSO-2-: Describe the importance of values education in the 21st century.

PSO-3-: Explain/ describe the need of values in creating a better world.

PSO-4- Explain the promotion of value through education.

COURSE CODE: DSEED 504: MENTAL HEALTH ISSUES (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Explain the need and importance of understanding the concepts of mental health and hygiene in the emerging society.

PSO-2-: Empathize with people having psychological and maladjustment problems.

PSO-3-: Describe the role of different agencies of society and their impacts on the development of an individual's personality.

PSO-4-: describe the various components of positive psychology and its significance in the teaching learning processes.

PSO-4-: integrate yoga in their day-to-day lives for holistic health.

B.A 5th SEMESTER (NON-HONOURS COURSE)

COURSE OUTCOME (CO):

The student will be able to understand the importance of value education in the 21st century and how to inculcate these values through education. The students will be able to understand the need and importance of Mental Health and Hygiene in the emerging society and different Mental Health Issues. The student will understand the concept of Positive Psychology and learn to integrate yoga in their day to day life for holistic health.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: EDDSEN 506: VALUE EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to

PSO-1- Explain the concepts of values and value education.

PSO-2- Describe the importance of value education in the 21st century.

PSO-3- Describe the need of values in creating a better world.

PSO-4- Explain the promotion of value through education.

COURSE CODE: EDDSEN 508: MENTAL HEALTH ISSUES (CREDIT: 6)

On completion of the course, the students will be able to

PSO-1- Explain the need and importance of understanding the concepts of mental health and hygiene in the emerging society.

PSO-2- Empathize with people having psychological and maladjustment problems.

PSO-3- Describe the role of different agencies of society and their impacts on the development of an individual's personality.

PSO-4- Describe the various components of positive psychology and its significance in the teaching learning processes.

PSO-5- Integrate yoga in their day-to-day lives for holistic health.\

B.A 6th SEMESTER (HONOURS COURSE)

COURSE OUTCOME (CO):

The Students will come to know about the role of constitution in providing equal educational opportunities in the diverse Indian Society. The student will be able to identify the challenges of Indian education at different levels and how to overcome these challenges. The student will able to know about the developmental changes of childhood and adolescence period and how society can monitor and guide the young children in their proper development. The student will be able to acquire practical experience of analyzing the problems of education through conducting field study and preparation of project report.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE EDNH 601: EMERGING TRENDS IN INDIAN EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1: Explain the need of constitutional provisions for education, and the role of constitution in equalizing educational opportunities in the diverse Indian Society.

PSO-2: Identify and explain the challenges of Indian education at different levels.

PSO-3-: Suggest measures to overcome the challenges of Indian education system.

PSO-4-: Define the new perspectives of education such as Environmental education, Inclusive education, Gender education, Inclusive education, Adult education, Human right education, Value education, population education etc.

PSO-5-: Critically examine the initiative taken by government of India in encounter the challenges of the new perspectives of education

 PSO-6-: Evaluate various plans and policies regarding the educational set up in India.

PSO-7-: Explain the political influences on the national education system.

PSO-8- Analyze the role of international agencies in development of education

COURSE CODE EDNH 602: (CHILD AND ADOLESCENT PSYCHOLOGY

(CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Explain the significance of a study of childhood and adolescence today.

PSO-2-Describe the developmental changes of childhood and adolescence

PSO-3-: Summarize the effect of family dynamics on child and adolescent development

PSO-4-: Explain the significance of the role of society in monitoring and guiding young children in their proper development.

COURSE CODE DSEED 602: ECONOMICS OF EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Describe the meaning, scope and importance of Economics of Education.

PSO-2-: Define and illustrate the concepts used in economics of Education.

PSO-3-: Examine the historical development of Economics of Education.

PSO-4-: Explain the concept of Education as a good, demand and supply of education, Utility of Education etc.

PSO-5-: Explain the concept of investment in education, return on investment in education, education as production process etc.

PSO-6-: Explain the concepts of different types of Educational cost.

PSO-7-: Examine the concepts of human capital formation, Education financing, Educational Planning etc.

COURSE CODE DSEED 604: PROJECT REPORT (CREDIT: 6)

On completion of the course, the students will be able to -

PSO-1-: Explain the process of conducting a Project.

PSO-2-: Identify the problems for Educational Project.

PSO-3-: Solve problems faced in educational field through project. d.

PSO-4-: Prepare a project report.

B.A 6th SEMESTER (NON- HONOURS COURSE)

COURSE OUTCOME (CO):

The student will be able to understand about the process of management in education. The student will be able to understand the concept of educational management and educational leadership. The student will understand importance of supervision in the management of education. The student will understand the concept of sex and gender, Patriarchal and Matriarchal, Gender segregation, Gender stereotyping, Gender biases Gender socialization etc. The student will understand the issues related to gender inequality in school. The student will learn about laws, articles and policies to bring gender equality.

PROGRAMME SPECIFIC OUTCOME (PSO)

COURSE CODE: EDDSEN601: EDUCATIONAL ADMINISTRATION AND MANAGEMEN (CREDIT: 6)

On completion of the course, the students will be able to

PSO-1- Define the concept of Educational Management.

PSO-2- Describe the types of management and modern trends of Educational management.

PSO-3- Define the concept of educational leadership

PSO-4- Explain the principles of educational leadership

PSO-5- Describe the styles of leadership and its implication in educational leadership.

PSO-6- Define the concept of educational planning and its importance

PSO-6- Analyze the role and importance of educational supervision

PSO-6- Suggest measures to ensure quality in educational management.

COURSE CODE: GEEDN 603: GENDER AND EDUCATION (CREDIT: 6)

On completion of the course, the students will be able to

PROGRAMME SPECIFIC OUTCOME

COURSE CODE: GEED202: GENDER AND EDUCATION   (CREDIT 6)

On completion of the course, the students will be able to

PSO-1: Explain the meaning and nature of gender and its related terms.

PSO-2: Describe the gender biases and gender inequality in family, school and society.

PSO-3: Describe the gender issues related to school education.

PSO-4: Analyse the laws and policies related to gender equality.

PROGRAMME SPECIFIC OUTCOME OF DEPARTMENT OF ENGLISH (HONS.)

DEPARTMENT OF ENGLISH, GARGAON COLLEGE

After the completion of the programme the learners would be able to-

PSO1   Understand and appreciate the rich cultural heritage of ancient Indian literature, specially Sanskrit Literature

PSO2 Get acquainted with the great heritage of European Classical Literature ranging from Homer's epic the Iliad to the satires of Horace. They will get to know of the difference between the Greek classics and the Latin classics, the different genres practised by the classical writers etc.

PSO3 Appreciate Indian Writing in English from the colonial to the postcolonial period, to understand the diversity of Indian culture and tradition across spatiality,

PSO4 Understand British poetry and drama from Chaucer to Shakespeare

PSO5 Get acquainted with American Literature and understand issues such as the reality or illusion of the great American dream, the transcendentalist movement, the history of slavery in the South among others

PSO6 Acquainted with popular literature such as crime thriller, graphic fiction, children's literature etc.

PSO7 Understand English literature of the 17th and 18th century with emphasis of the Puritan interregnum and the Restoration

PSO8 Understand the 18th century British literature with focus on Restoration comedy by William Congreve, satire by Swift and 18th poetry and novels.

PSO9 Make the students aware of the literature of the Romantic period with emphasis on Romantic poetry and novels

PSO10 get familiarised with the 19th century novelists and poets especially Victorian literature including works by Austen, Bronte, Tennyson, Browning etc.

PSO11 to get acquainted with women's writing and understand the manner in which power operates to silence women from articulating their views and also the ways in which the women's writing transcends the male writing tradition through various ways

PSO12 to appreciate the early 20th century British literature which incorporates philosophical trajectories such as symbolism, existentialism, cubism etc. as reflected in its novels and poetry.

PSO13 Understand modern European drama by placing the epochal events of the period as the backdrop including the works of Ibsen, Brecht, Backett etc.

PSO14 Gain ideas on the introduction to Postcolonial Literature and acquaint themselves with seminal postcolonial novels such as the works of Chinua Achebe, Marquez, Bessie Head, Pablo Neruda, Mamang Dai etc.

PSO15 (DSE1) Get acquainted with the works of Indian writer's working on regional literature with a special focus on the translated works of Indian writing

PSO16 (DSE2) Get introduced to the literature of the Indian Diaspora with particular emphasis on the writers like M.G. Vassani, Rohinton Mistry, Meera Syal and Jhumpa Lahiri

PSO17 (DSE-3) Appreciate the major trends in criticism from the Romantic period to the present comprising the works on the Romantic theory of poetry by Wordsworth and Coleridge and Modernist poetry of Woolf and Eliot.

PSO18 (DSE-4) Understand World literature and know about the form and content of texts that are part of different spatiality.

PSO19 (DSE-5) Get acquainted with the major discourses on theories such as Marxism, Feminim, Post- Structuralism and Postcolonial Studies

PSO20 (DSE-6) Gain knowledge about the major works on cinema and literary narrative

PSO21 (DSE-7) Capture the sense of the backgrounds of the literature concerning the Partition of India and Pakistan

PSO22 (DSE-8) Understand the writings of travellers documenting the ways of a foreign culture

PSO23 (AECC1) Understand the theory, fundamentals, tools of communication and develop in them vital communication skills

PSO24 (AECC2) Appreciate some of the most representative prose pieces and short stories in the Western literary and cultural cannon as well as important texts from Indian writing in English.

PSO25 (Non-Hons) Understand the basic four skills of listening, speaking, reading and writing

PSO26 (Alt. Eng) Comprehend the issues the themes that have contemporary relevance pertaining to race, class, gender and environment

COURSE OUTCOME OF THE DEPARTMENT OF ENGLISH

COURSE CODE: 10100 (INDIAN CLASSICAL LITERATURE)

CO 1: The course will enable the students to understand and appreciate the rich cultural heritage of ancient Indian literature, specially Sanskrit Literature. After completing this course, the learners shall be in a position to understand and appreciate the rich Indian classical literary tradition, including its distinctive aesthetic philosophies. It would provide them with the conceptual resources to make a comparative assessment between the Indian and the Western classical tradition, thereby enabling their knowledge and understanding of the two great ancient literary traditions.

CO 2: Classical Sanskrit Drama

CO 3 : Selections from epic Sanskrit literature

CO 4: Sanskrit Drama

CO 5 : Classical Assamese Drama

COURSE CODE: 10200 (EUROPEAN CLASSICAL LITERATURE)

CO 1: After the completion of the course, the learners shall be in a position to understand the source of Western literary paradigm – a formation that was responsible for constituting the great tradition of the western canon, and one which govern our critical or comparative touchstone on „what good literature ought to be." Learners will be acquainted with immortal classics like *The Iliad* and *Metamorphosis*

CO 2: Classical Greek Epic

CO 3: Classical Greek Tragedy

CO 4: Classical Roman Comedy

CO 5: Classical Roman Epic/Narrative Poem

COURSE CODE: 20100 (INDIAN WRITING IN ENGLISH)

CO 1: It is believed that learners, after the culmination of this course, shall be in a better position to appreciate the diversity of customs and traditions in India, would be able to map the intellectual trajectory from the pre- to post -independence period, and get the feel of the advancement that Indian writers in English are making

CO2 : Pre-Independence Indian English Novel

CO3: Post-Independence Indian English Novel

CO4: Post-Independence Indian English Novel

CO5 : Post-Independence Indian English Novel

COURSE CODE: 20200 (BRITISH POETRY AND DRAMA: 14TH TO 17TH CENTURIES)

CO1 : After completing this course, the learners would be in a position to determine the influence of the European Renaissance on the works of the Elizabethan authors, including Shakespeare

CO2: ELIZABETHAN POETRY

CO3: ELIZABETHAN/RENAISSANCE DRAMA

CO4: SHAKESPEARE'S TRAGEDY

CO5: SHAKESPEARE'S COMEDY

COURSE CODE: 30100 (AMERICAN LITERATURE)

CO1: It is hoped that learners would get a feel of American literature and they will be able to understand the poetics and politics of a literature characterised both by liberal and reactionary ideals.

CO2: : DRAMA

CO3: AFRICAN-AMERICAN NOVEL

CO4: SHORT STORIES

CO5: POETRY

COURSE CODE: 30200 (POPULAR LITERATURE)

CO1: After the completion of this course, it is believed that learners would be in a position to appreciate the presence of a creative space and process that has the potential to affect readers to a degree that high-brow literature cannot achieve due to its propensity to target only a niche audience.

CO2: CHILDREN'S LITERATURE

CO3: CRIME THRILLER

CO4: LGBT FICTION

CO5: GRAPHIC NOVEL

COURSE CODE: 30300 (BRITISH POETRY AND DRAMA: 17TH AND 18TH CENTURIES)

CO1: After the completion of this course, learners will be in a position to understand the ways in which English drama and poetry began to emphasize on the importance of adhering to classical norms and forms.

CO2: PURITAN EPIC

CO3: JACOBEAN DRAMA

CO4: RESTORATION COMEDY

CO5: NEOCLASSICAL/AUGUSTAN MOCK EPIC

COURSE CODE: 40100 (BRITISH LITERATURE: 18TH CENTURY)

CO1: After the completion of this course, learners will be in a position to understand the spirit of the age, as well as the literature embodying this spirit.

CO2: RESTORATION COMEDY

CO3: SATIRE/FANTASY

CO4: 18TH CENTURY POETRY

CO5: 18TH CENTURY NOVEL

COURSE CODE: 40200 (BRITISH ROMANTIC LITERATURE)

CO1: It is hoped that the learners would be in a position to know and appreciate the values of a literature characterised by emotion, passion, love towards nature, exerting of imagination and so forth in order to create a thing of beauty, which would be a joy forever.

CO2: PRE-ROMANTIC POETRY/LITERATURE

CO3; ROMANTIC POETRY

CO4: HIGH ROMANTIC POETRY

CO5: ROMANTIC NOVEL (THE GOTHIC)

COURSE CODE: 40300 (BRITISH LITERATURE: 19TH CENTURY)

CO1: The learners will be in a position to understand the philosophical shift that came about due to the crises of faith pertaining to the culture of positivism that manifested its full presence during the Victorian period. It is also hoped that they would be able to understand concepts like utilitarianism, surplus value, Victorian prudishness, survival of the fittest etc.

CO2: EARLY NINETEENTH-CENTURY NOVEL

CO3: MID NINETEENTH-CENTURY NOVEL

CO4: VICTORIAN NOVEL

CO5: VICTORIAN POETRY

COURSE CODE: 50100 (WOMEN'S WRITING)

CO1: It is hoped that the learners after completing this course, would be sensitised to genderrelated issues, and would be able to see things from the perspective of the Other.

CO2: POETRY

CO3: NOVEL

CO4: SHORT STORY

CO5: ESSAY/MEMOIR

COURSE CODE: 50200 (BRITISH LITERATURE: THE EARLY 20TH CENTURY)

CO1: It is believed that the learners would benefit from this course in terms of getting acquainted with concepts like stream-of-consciousness, Oedipus complex, avant garde, gyre, interior monologue, among many others.

CO2: NOVELLA

CO3: MODERN NOVEL

CO4: STREAM OF CONSCIOUSNESS NOVEL

CO5: MODERNIST POETRY

COURSE CODE: 60100 (MODERN EUROPEAN DRAMA)

CO1: It is hoped that the learners after completing this course will be in a comfortable space to know Modern drama with its entire attendant problematic.

CO2: REALIST DRAMA

CO3: EPIC THEATRE

CO4: ABSURD DRAMA

CO5: AVANT-GARDE DRAMA

COURSE CODE: 60200 (POSTCOLONIAL LITERATURES)

CO1: The learners on culmination of the course are expected to be acquainted with both the texts and the contexts of the given period.

CO2: AFRICAN NOVEL

CO3: LATIN AMERICAN NOVEL

CO4: SHORT STORY

CO5: POETRY

COURSE CODE: 50110 (DSE 1: MODERN INDIAN WRITING IN ENGLISH TRANSLATION)

CO1: After completing this course, it is expected that learners will be in a position to appreciate the literature of India as it exists in various regional languages. They would be able to understand the political, social and economic factors affecting people across regions and cultures.

CO2: SHORT STORIES

CO3: POETRY

CO4: PLAY

CO5: NOVEL

COURSE CODE: 50120 (DSE 2: LITERATURE OF THE INDIAN DIASPORA)

CO1: After completing this course, it is expected that learners will be in a position to understand the complexity of living as hyphenated identities in a space which is different from that of „home". They will be in a better position to understand the postcolonial condition of identities caught between the quest for a better life abroad and the acknowledgement of the futility surrounding such a rootless mobility

CO2: M.G. Vassanji The Book of Secrets

CO3: Rohinton Mistry A Fine Balance

CO4: Meera Syal Anita and Me

CO5: Jhumpa Lahiri The Namesake

COURSE CODE: 50130 (DSE 3: LITERARY CRITICISM)

CO1: William Wordsworth: "Preface" to the Lyrical Ballads (1802), S.T. Coleridge: Biographia Literaria. Chapters IV, XIII and XIV

CO2: Virginia Woolf: "Modern Fiction", T.S. Eliot: "Tradition and the Individual Talent" (1919), "The Function of Criticism" (1920)

CO3: I.A. Richards: Principles of Literary Criticism Chapters 1, 2 and 34. (London, 1924) and Practical Criticism. (London, 1929)

CO4: Cleanth Brooks: "The Heresy of Paraphrase", and "The Language of Paradox" in The Well-Wrought Urn: Studies in the Structure of Poetry (1947), Maggie Humm: Practising Feminist Criticism: An Introduction. London 1995

COURSE CODE: 50140 (DSE 4: WORLD LITERATURES)

CO1: By the end of the course, the student will be able to identify and analyse a variety of major works of world literature; compare and contrast writing styles and generic forms from different periods and cultures; identify major themes of representative poetic and fictional works, and trace the influence of one literature upon another

CO2: V.S. Naipaul, Bend in the River

CO3: Marie Clements, The Unnatural and Accidental Women, in Staging Coyote's Dream: An Anthology of First Nations, ed. Monique Mojica and Ric Knowles

CO4: Antoine De Saint-Exupery, The Little Prince, Julio Cortazar, „Blow-Up", in Blow-Up and other Stories

CO5: Judith Wright, „Bora Ring", in Collected Poems, Gabriel Okara, „The Mystic Drum", in An Anthology of Commonwealth Poetry, ed. C.D. Narasimhaiah, Kishwar Naheed, „The Grass is Really like me", in We the Sinful Women, Shu Ting, „Assembly Line", in A Splintered Mirror: Chinese Poetry from the Democracy Movement, tr. Donald Finkel, additional translations by Carolyn Kizer, Jean Arasanayagam, „Two Dead Soldiers", in Fussilade

COURSE CODE: 60110 (DSE 5: LITERARY THEORY)

CO1: By the end of this course, the learners shall be in a position to know some of the significant texts of discourses revolving around class, gender, power, language, race, identity and so forth. They will be able to relate their reading of literature through such theories, which would in turn facilitate their interpretive strategies.

CO2: MARXISM

CO3: FEMINISM

CO4: POSTSTRUCTURALISM

CO5: POSTCOLONIAL STUDIES

COURSE CODE: 60120 (DSE 6: LITERATURE AND CINEMA)

CO1: The learners are expected to understand the elements involved in adapting texts to film. They will demonstrate analytical skills in visual literacy and reading filmic texts. Students will demonstrate a familiarity with ways of discussing and evaluating films as reflections of cultures and source texts.

CO2: James Monaco, „The language of film: signs and syntax", in How To Read a Film: The World of Movies, Media & Multimedia

CO3: William Shakespeare, Romeo and Juliet, and its adaptations: Romeo & Juliet (1968; dir. Franco Zeffirelli, Paramount); and Romeo + Juliet (1996; dir. Baz Luhrmann, 20th Century Fox).

CO4: Bapsi Sidhwa, Ice Candy Man and its adaptation Earth (1998; dir. Deepa Mehta, Cracking the Earth Films Incorp.); and Amrita Pritam, Pinjar: The Skeleton and Other Stories, tr. Khushwant Singh (New Delhi: Tara Press, 2009) and its adaptation: Pinjar (2003; dir. C.P. Dwivedi, Lucky Star Entertainment)

CO5: Ian Fleming, From Russia with Love, and its adaptation: From Russia with Love (1963; dir. Terence Young, Eon Productions).

COURSE CODE: 60130 (DSE 7: PARTITION LITERATURE)

CO1: After the culmination of this course, the learners will be in a position to comprehend the magnitude of the tragedy of partition and realise how the trauma associated with it impinges on the victim"s daily lives and activities even in the present. The historical fact transmuted by imagination tends to prove the validity of literature in representing the truth of the human condition. This is what the course will attempt to highlight.

CO2: Intizar Husain, Basti, tr. Frances W. Pritchet

CO3: Amitav Ghosh, The Shadow Lines

CO4: Dibyendu Palit, „Alam‟s Own House‟, tr. Sarika Chaudhury, Manik Bandhopadhya, „The Final Solution‟, tr. Rani Ray, Sa‟adat Hasan Manto, „Toba Tek Singh", Lalithambika Antharajanam, „A Leaf in the Storm‟, tr. K. Narayana Chandran

CO5: Faiz Ahmad Faiz, „For Your Lanes, My Country‟, in In English: Faiz Ahmad Faiz, A Renowned Urdu Poet, tr. and ed. Riz Rahim, Jibananda Das, „I Shall Return to This Bengal‟, tr. Sukanta Chaudhuri, in Modern Indian Literature, Gulzar, „Toba Tek Singh‟, tr. Anisur Rahman, in Translating Partition, ed. Tarun Saint et. al.

COURSE CODE: 60140 (DSE 8: TRAVEL WRITING)

CO1: The learners would be in a position to understand the cultural dynamics of narratives written by travellers. They will be able to appreciate the difference in representation from the category of gender, religion and race. The learners will realise that travel narratives are always already ideological in import, and hence they can only be regarded as representations , rather than truth.

CO2: Ibn Batuta: „The Court of Muhammad bin Tughlaq‟, Khushwant Singh‟s City Improbable: Writings on Delhi, Al Biruni: Chapter LXIII, LXIV, LXV, LXVI, in India by Al Biruni, edited by Qeyamuddin Ahmad,

CO3: Mark Twain: The Innocent Abroad, Ernesto Che Guevara: The Motorcycle Diaries: A Journey around South America (the Expert, Home land for victor, The city of viceroys)

CO4: William Dalrymple: City of Dijnn, Rahul Sankrityayan: From Volga to Ganga

CO5: Nahid Gandhi: Alternative Realties: Love in the Lives of Muslim Women, Elisabeth Bumiller: May You be the Mother of a Hundred Sons: a Journey among the Women of India.

COURSE CODE: 10310 (AECC 1: ENGLISH COMMUNICATION)

CO1: It is hoped that after studying this course, students will find a difference in their personal and professional interactions.

CO2: COMMUNICATION: THEORY AND TYPES

CO3: SPEAKING SKILLS

CO3: READING AND UNDERSTANDING

CO4: WRITING SKILLS

COURSE CODE: 10320 (AECC 2: ALTERNATIVE ENGLISH)

CO1: After completing this course, learners will be in a position to understand and appreciate the value of the two sub-genres, prose and short stories. The former is non-fictional, and the latter is fictional in mode. They will be able to understand cultural practices of two different spatiality-the West and the East. It will broaden their perspective to accommodate disparate ideologies that operate in different spaces on account of cultural differences

CO2: PROSE

CO3: SHORT STORIES

Core: English: Writing Skills I (5+1 credits)

By the end of the two-semester course the learner should have sufficient vocabulary to read and understand narratives, write coherently, summarise and understand tape scripts/read-aloud, speak fluently and narrate at length with minimal errors in syntax.

PROGRAMME SPECIFIC OUTCOME OF GEOGRAPHY HONOURS
DEPARTMENT OF GEOGRAPHY, GARGAON COLLEGE

After graduation the student will be able to-

PSO 1: understand the position of geography among the earth sciences and its importance and interrelationship.

PSO 2: have in-depth knowledge in physical geography particularly formation of landform and its associated processes, world distribution of flora and fauna and their factors, marine resources etc.

PSO 3: acquire knowledge on elements, factors of climate and its influence on mankind in a global perspective.

PSO 4: assess man-nature relationship and resource management.

PSO 5: acquire knowledge on physical environment and its role in maintaining biodiversity along with human impact on different environments, environmental impact assessment.

PSO 6: handle population data including estimation of population, causes and consequences of population growth, population policies.

PSO 7: handle statistical data, interpretation and model building.

PSO 8: prepare map of different themes following different map projections.

PSO 9: earn knowledge on recent space technologies including interpretation of Satellite Imagery, Aerial Photographs, Geographical Information System and Global Positioning System (GPS).

PSO 10: acquire expertise in survey works by using plane table, prismatic compass, Dumpy's Level and Theodolite and subsequently able to prepare map on local level for the planning purpose.

PSO 11: acquaint with the present geo-political issues of South East Asia including major insurgency activities in the regional and local level.

COURSE OUTCOME OF GEOGRAPHY:

SEMESTER I

PAPER-GGRM101T4: GEOMORPHOLOGY   AND BIO GEOGRAPHY

Students will be able to acquire diverse set of knowledge relating to landforms development over the earth crust. It would enhance the understanding level of student about the forces acting on the interior and exterior of the earth

CO1: Students will be familiar with the theories in Geomorphology.

CO 2: Students will be familiarizing with geomorphic processes.

CO3: It deals with Biogeography.

Paper-GGRM101P2: GEOMORPHIC TECHNIQUES (PRACTICAL)

This paper would improve the practical skill of students in morphometric techniques used in drainage analysis.

CO1: it would develop cartographic skills of learners

CO2: it deals with Morphometric Analysis

Paper-GGRM102T4: CLIMATOLOGY (Theory)

The student would become familiar with climate, its types and its different atmospheric processes relating to the troposphere of the earth. It would upgrade students understanding in nature and behavior of different atmospheric phenomena's and its pattern of distribution.

CO1: It deals with the atmosphere and its components.

CO2: It deals with Humidity, precipitation and atmospheric disturbances.

CO3: It deals with the classification of climate, climate change and recent issues.

Paper-GGRM102P2: PRACTICALS BASED ON CLIMATIC DATA

This paper would improve the learner's ability in climate data analysis and interpretation.

CO1: Study covers the drawing and interpretation of weather maps.

CO2: Deals with the different forms of climate variability graphs and maps.

Paper-GGRM201T6: HUMAN GEOGRAPHY (Theory)

It will increase the understanding in human geography and its importance in present days. The students will gain knowledge about population growth and factors responsible for uneven distribution of population in the world. The student will also acquire knowledge about the population resource relationship and various types of settlement pattern.

CO1: Deals with the concept of Human Geography, Major themes, contemporary importance alongside cultural and societal development.

CO2: Deals with pattern of pattern of settlement; its origin and development.

CO3: Deals with Population growth and distribution, Population regions and Resources.

PROGRAMME SPECIFIC OUTCOME OF GEOGRAPHY (NON-HONOURS)

After graduation the student will be able to-

PSO 1: understand the position of geography among the earth sciences and its importance and

interrelationship.

PSO 2: have in-depth knowledge in physical geography particularly formation of landform and its associated processes, world distribution of flora and fauna and their factors, marine resources etc.

PSO 3: acquire knowledge on elements, factors of climate and its influence on mankind in a global perspective.

PSO 4: assess man-nature relationship along with environment and natural resource management.

PSO 5: acquire knowledge on physical environment and its role in maintaining biodiversity along with human impact on different environments, environmental impact assessment.

PSO 6: Understand cause and consequences of population distribution, density alongside settlement type and distribution over the earth.

PSO 7: Build theoretical and practical help in handling statistical data, interpretation and model building.

PSO 8: prepare map of different themes following different map projections.

PSO 9: Develop knowledge on recent space technologies including interpretation of Satellite Imagery, Aerial Photographs, Geographical Information System and Global Positioning System (GPS).

101T6: PHYSICAL GEOGRAPHY

It will make the students comprehend the various component of the earth, composition of atmosphere and various climatic processes. The students will also learn about components of hydrological cycle and its intervention by anthropogenic activities. The course also familiarizes bottom configuration and ocean dynamics.

CO1: Students will be familiar with components of earth system.

CO 2: Students will be familiarizing with major climatic processes.

CO3: It deals with internal structure of earth and fluvial cycle of erosion

CO4: It deals with the major marine processes.

201T6: HUMAN GEOGRAPHY

It will introduce upgrade conceptual background of students in the field of human geography and its importance in present days. The students will also learn about population growth and factors

responsible for uneven distribution of population in the world. The student will also gain knowledge about the population resource relationship and various types of settlement pattern

CO1: Students will be familiar with culture, race and religion

CO 2: Students will be familiarizing population growth, distribution, density and composition over the surface of the earth

CO3: It deals with concept, classification and development of rural and urban settlement.

301T6 General Cartography (Practical)

It will enlighten the students with the different types of map projection and its uses

CO1: It deals with concept and types of map projection

CO2: It deals with the uses and significance of different map projection

CO3: It deals with the different method for representation of thematic maps.

401T6: Environmental Geography

It will develop conceptual and theoretical ideas of environment as well as relationship between man and environment in different geo climatic regions. The learners will also attain the nature and intensity of some burning environmental issues at local, regional and global along with mitigation programs and policies

CO1: Deals with the concept, structure and function of ecosystem.

CO2: Deals with man –environment relationship over different regions of the earth.

CO3: Deals with different environmental problems, programs and policies for environment management at local and global level.

SEC (Skill Enhancement Course)

SEC301AP2: REGIONAL PLANNING AND DEVELOPMENT

It will introduce the student about the basic knowledge of regions and the need of regional planning in India. The students will also learn about the strategies and models used for regional planning.

CO1: Deals with concept, types and need of regional planning.

CO2: Deals with different models for economic growth and development.

CO3: Deals with different plans for the development of backward regions.

SEC401AP2: REMOTE SENSING AND GPS BASED PROJECT REPORT (PRACTICAL)

It will enhance of the ability of the learners in the field of latest satellite based technology and data source such as remote sensing

CO1: It deals with Historical evolution Remote sensing technology.

CO2: Deals with energy sources and its interception with earth surface and atmosphere.

CO3: Deals with different sensors and platforms of remote sensing.

CO4: Deals with the use and application of diversified remote sensing data in GIS environment for geographical analysis

SEC501AP2: GIS BASED PROJECT REPORT (PRACTICAL)

It will enhance of the ability of the learners in the field of mapping using GIS technologies

CO1: It deals with software application in GIS Technology

CO2: Deals with general and specialized application of diversified remote sensing data in GIS environment for geographical analysis.

SEC601AP2: FIELD TECHNIQUES AND SURVEY BASED PROJECT REPORT

It will finally improve the skill of students to conduct an extensive survey over an area to evaluate the nature, intensity, frequency and impact of human on landforms and flora and fauna.

CO1: Deals with the conceptual background for field base study

CO2: Deals with the various methods of collecting primary data during field survey.

CO3: Deals with final preparation of field based report.

DSE (Discipline specific Elective)

DSE 1 DSE 501AT6: GEOGRAPHY OF INDIA

It will make students familiar with the various aspects of India. The students will learn about the physical, anthropogenic and economic diversity of India and the factors responsible for such diversities

CO1: Deals with the Physical Geography of India.

C02: Deals with Population distribution and composition of India.

CO2: Deals with urban and rural settlements in India

C04: Deals with livestock, power and mineral distribution in India

C05: Deals with agriculture and transportation in India

DSE 501BT6: ECONOMIC GEOGRAPHY

It will enhance the learner with the basic ideas of primary, secondary and tertiary activities and its spatio-temporal pattern. The learners will also acquire the knowledge of some economic development models in relation to agriculture and industry.

CO1: Students will be familiar with concept and pattern of development

CO 2: Students will be familiarizing with type and distribution of primary and secondary activities.

CO3: It deals with diverse mode of global distribution of transport and communication technology.

DSE 601AT6: DISASTER MANAGEMENT

It will make the students aware about the concepts of hazards, disasters, risk and vulnerability. Students will also learn about the Do's And Don'ts during on and post disaster situation.

CO1: Students will be familiar with concept, types of hazard and disaster

CO 2: Students will be familiarizing with cause and consequences of major hazard and disasters with special reference to India

CO3: It deals with diverse organizations for mitigation and preparedness of Disasters.

DSE601BT6: GEOGRAPHY OF TOURISM

It will make the students aware about the scope and nature of tourism. The students will also learn about the impact of tourism in the economy, environment and society.

CO1: Students will be familiar with concept, types and nature of tourism

CO 2: Students will be familiarizing with different infrastructural requirement for tourism industry

CO3: It deals with various forms of impacts of tourism industry in environment and society.

GE (Generic Elective)

GE 1 GE 501AT6: Disaster Risk Reduction

It will make the students aware about the concepts of hazards, disasters, risk and vulnerability. Students will also learn about the Do's And Don'ts during on and post disaster situation.

CO1: Students will be familiar with concept, types of hazard and disaster

CO 2: Students will be familiarizing with cause and consequences of major hazard and disasters with special reference to India

CO3: It deals with diverse organizations for mitigation and preparedness of Disasters.

GE 601AT6: SUSTAINABILITY AND DEVELOPMENT

It will make the students understand the basic concept and history of development of sustainable development. The students will also know about the role of various agencies in sustainable development.

CO1: Students will be familiar with concept and components of sustainable development

CO 2: Students will be familiarizing with needs and major issues for sustainable development.

CO3: It deals with diverse set of program and policies required for sustainable development.

GGRM202T4: GEOGRAPHY OF INDIA (Theory)

It will familiarize learners' with various aspects of India. The students will learn about the physical, anthropogenic and economic diversity of India and the factors responsible for such diversities.

CO1: Deals with the Physical Geography of India.

C02: Deals with Population distribution and composition of India.

CO2: Deals with Mineral and Power Resources of India.

CO4: Deals with Physical Geography of N.E.India.

CO5: Deals with Agriculture, Mineral and industries of Assam.

GGRM202P2: PRACTICAL ON THEMATIC CARTOGARPHY

This course would enhance the practical skill of students in various application of thematic mapping and shape index analysis.)

CO1: deals with preparation of thematic mapping.

CO2: Deals with Shape index analysis of India.

GGRM301T4: CARTOGRAPHY (Theory)

This course would aware students about the history of map projection and utility of different types of map projection. It would also enlighten the students about the various surveying methods and the instrument used in it.

CO1: Deals with history, development and types of map projection.

CO2: Deals with cartographic methods and surveying by different techniques.

GGRM302P2: CARTOGRAPHIC TECHNIQUES (PRACTICAL)

This course will develop the skills of students in the field of map making and projection.

CO1: Deals with construction of different types of map projection.

GGRM302T6: REGIONAL GEOGRAPHY OF WORLD (Theory)

It will improve the understanding of the learner about climate, soil and topography in different continents of the world. The course will also disseminates knowledge relating to industrialization and population distribution in developed, developing and underdeveloped nations of the world.

CO1: Deals with Regional geography of Asia, North America, Europe and Africa.

CO2: Deals with industrial development over different counties

of the World

CO3: Deals with population distribution of the World.

CO4: Deals with regional studies of Middle East, South East Asia

and Mediterranean

GGRM303T6: STATISTICAL METHODS IN GEOGRAPHY (Theory)

This course will enhance students' ability in various statistical techniques required in different geographical studies.

CO1: Deals with types and source of Data along various scale of

measurement

CO2: Deals with measure of central tendency and dispersion

CO3: Deals with types of sampling and Probability distribution

CO4: Deals with Correlation and Regression analysis

GGRM401T6: STATISTICAL METHODS IN GEOGRAPHY (Theory)

It will enhance the learner with the basic ideas of primary, secondary and tertiary activities and its spatio-temporal pattern. The learners will also acquire the knowledge of some economic development models in relation to agriculture and industry.

CO1: Deals with models related to agriculture and industry.

CO2: Deals with aspects of Primary, Secondary and Tertiary activities.

CO3: Deals with Trade and Transport Services

GGRM402T6: ENVIRONMENTAL GEOGRAPHY (Theory)

It will enhance conceptual and theoretical ideas of environment as well as relationship between man and environment over different regions. The learners will also understand intensity of some burning environmental issues at local, regional and global level along with mitigation programs and policies.

CO1: It deals with Environmental Geography, Environmental Impact Assessment, Environment and disaster management.
CO2: Deals with Ecology and Ecosystem.

CO3: Deals with Global, nation and regional environmental programmes and policies.

GGRM403T4: REMOTE SESING AND GIS (Theory)

It will enhance the conceptual ability of the learners in the field of latest satellite based technology and data source such as remote sensing.

CO1: It deals with Historical evolution Remote sensing technology
CO2: Deals with energy sources and its interception with earth surface and atmosphere

CO3: Deals with different sensors and platforms of remote sensing

GGRM403P2: REMOTE SENSING AND GIS (PRACTICAL)

It will finally develop some deep sense of practical knowledge and skills in diversified applications of remote sensing data and technology in various geographical analyses.

CO1: It deals with software application in GIS Technology
CO2: Deals with the use and application of diversified remote sensing data in GIS environment for geographical analysis

GGRM501T4: REGIONAL PLANNING AND DEVELOPMENT (Theory)

It will improve the understanding of learners about Region, regionalization, Regional planning and development. It will also enhance learners conceptual background in incorporating different spatial and non-spatial models associated with economic growth and development of a region.

CO1: Deals with Regional concept and Planning.

CO2: Deals with methodology for delineation of planning region and regionalization

CO3: Deals with theories and models of economic growth and human development

GGRM 501P2: REGIONAL PLANNING AND DEVELOPMENT (Practical)

It will develop the practical skill of the learners in identification of regional disparity in terms of levels of development and resource distribution.

CO1: Deals with methods of demarcating developed and underdeveloped region

CO2: Deals with identifying resource disparities.

GGRM 502T4: POPULATION GEOGRAPHY (Theory)

It will enhance the learner with the basic ideas of population size, composition, growth and distribution along with its determinants. The course will also incorporate contemporary issues of population.

CO1: Deals with sources of Population Data

CO2: Deals with Population growth and distribution, Population growth models.

CO3: Deals with population dynamics and composition.

CO4: Deals with contemporary issues in Population

GGRM 502P2: POPULATION GEOGRAPHY (Practical)

It will develop the cartographic ideas for the representation of major Demographic data.

CO1: Deals with Statistical representation and analysis of Population flow and Concentration

CO2: Deals with representation of distribution and density of population

GGRM 601T4: EVOLUTION OF GEOGRAPHICAL THOUGHT (Theory)

It would finally familiarize the learner towards the development of geographic ideas during the era of ancient, pre-modern and modern period. The course will also enlighten the learners with the contemporary issues and approaches of development of the discipline.

CO1: Deals with origin, development f geography in ancient, medieval and modern period

CO2: Deals with conceptual ideas of geography

CO3: Deals with Quantitative revolution and post modern philosophies in Geography

GGRM602T6: DISASTER MANAGEMENT BASED PROJECT WORK

It will finally develop skill of the students to conduct an extensive survey over an area to evaluate the nature, intensity, frequency and impact of a Hazard/ disaster and suggesting possible mitigation measures.

CO1: Deals with conduct of field survey and preparation of field study report.

DSE (DISCIPLINE SPECIFIC ELECTIVE)

GGRM DSE501AT6: SETTLEMENT GEOGRAPHY
It will develop understanding of the learner about the concept, types and the classification of settlements. The course also familiarizes learners with the basic theories of market center and settlement evolution.

CO1: Deals with classification and distribution of settlement

CO2: Deals with hierarchy of settlements

CO3: Deals with theories of market center.

GGRM DSE501B T6: AGRICULTURAL GEOGRAPHY

It will enhance the concept of agricultural activities, its determinants and types under different geo-environmental condition of the world. The course w i l l also familiarize learners with some Land use and cropping intensity models

CO1: Deals with land use land cover classification

CO2: Deals with determinants of agriculture

CO3: Deals with major concept of agriculture and agricultural regions

GGRM DSE 602AT6: HYDROLOGY AND OCEANOGRAPHY

It will enhance the students about the concept and components of hydrological cycle and its intervention by anthropogenic activities. The course also incorporates bottom configuration and ocean dynamics along with physical and chemical properties of ocean sea water.

CO1: Students will be familiar with the different hydrological processes acting on the atmosphere, surface and sub-surface level.

CO 2: Students will be familiarizing with river basin characteristics with issues of flood and drought

CO3: it deals with major processes of the marine environment along with bottom configuration of oceans.

CO3: it also deals with marine deposits and reef buildings.

GGRM DSE 602BT6: SOCIAL GEOGRAPHY

It will make the student understand the basic concept of social geography and the impact of technologies in social changes. The student will also know about the different social categories and social problems faced by the society today.

CO1: Deals with concept, nature and scope of social geography

CO2: Deals with social categories with spatial distribution

CO3: Deals with major concept of welfare and well-being's of society

CO4: Deals with major conflict and issues of human society.

GE (Generic Elective)

GGRM GE 101BT6: GEOGRAPHY OF TOURISM

It will make the students aware about the scope and nature of tourism. The students will also learn about the impact of tourism in the economy, environment and society.

CO1: Deals with concept, nature, scope and issues of tourism

CO2: Deals with type of tourism; international and national perspective

CO3: Deals with infrastructure of tourism.

CO4: Deals with impact of tourism in society, economy and environment.

GGRM GE201BT6: REGIONAL DEVELOPMENT

It will improve the knowledge of student about the basic of regions and the need of regional planning in India. The students will also learn about the strategies and models used for regional planning

CO1: Deals with Regional concept, Planning and development.

CO2: Deals with methodology for delineation of planning region and regionalization

CO3: Deals with theories and models of economic growth

CO3: Deals with issues associated with backward regions and plans for development.

GGRM GE301BT6: RURAL DEVELOPMENT

It will make the students understand meaning of rural development and the impact of rural economies on the overall economy of the country.

CO1: Deals with different approaches for rural development

CO2: Deals with different sectors and institutions of rural development

CO3: Deals with specific programs, approaches and services for rural development.

GGRM GE401AT6: INDUSTRIAL GEOGRAPHY

It will make the students aware about the nature and scope of industrial geography. The students will also know about the various industrial policies of India and impact of industries in the environment, society and economy of India.

CO1: Deals with types of industries and industrial location theories

CO2: Deals with major industrial belts and region of India

CO3: Deals with industrialization and its impact on society, economy and environment.

SEC (Skill enhancement Course)

GGRMSEC-I: Travel and tourism Management

It will make the students aware about the importance of tourism sectors in Economy. It will improve the understanding of students in management and functioning of tourism sector in a country.

CO1: Deals with types and growth of tourism.

CO2: Deals with structure and function of travel and tourism sector

CO3: Deals with concept of promoting sustainable tourism and eco-tourism

CO4: Deals with relation of tourism with environment and ecology.

PROGRAMME SPECIFIC OUTCOME (PSO) OF HISTORY (HONOURS)
DEPARTMENT OF HISTORY, GARGAON COLLEGE

PSO 1: HISHC101: The objective of this course is to analyse the various source materials for the reconstruction of Ancient Indian History and the approaches of historical reconstruction. The students will be acquainted with various ancient cultures, technology, political, economical and religious development of the period concerned.

PSO 2: HISHC102: The students will be acquainted with the evolution of humankind, the beginning of food production, the Bronze Age., advent of iron, the slave society in ancient Greece, the economy and the Political culture of the ancient Greece

PSO 3: HISHC103: The objective of this course is to acquaint the students with agrarian economy, the growth of urban centres in northern and central India and the Deccan as well as craft production, trade routes and coinage

PSO 4: HISHC104: The learners will be acquainted with the Roman Empire, slave society, the cultural and trade, the crisis and disintegration of the Roman Empire and Economic development in Europe from 7th to 14th centuries covering production, technological developments, growth of towns and trade and feudal crisis.

PSO 5: HISHC105: The objective of this course is to acquaint the students with the history of India from early medieval basically the political structures, Agrarian Structure and social change, trade and commerce and the religious and cultural developments.

PSO 6: HISHC106: The objective of this course is to familiarize the students about the rise of the modern west starting from the problem and theories of transition from Feudalism to Capitalism, Renaissance, European development of the 16th century and emergence of European state system and rise of Absolutism.

PS0 7: HISHC107: The objective of this paper is to acquaint the students with the History of India from c. 1206 to 1550 by interpreting the survey of sources for Delhi Sultanate, political structure of the sultanate, emergence of provincial dynasties, and acquaint the students with the society, economy, religion, society and culture of that time.

PSO 8: HISHC108: The objective of this paper is to familiarise the students about the socio economic and political conditions of 17th and 18th century in Europe, it also discussed about the end of absolute monarchy and the growth of parliamentary democracy and Industrial Revolution.

PSO 9: HISHC109: This course intends to acquaint the students about Persian sources and the consolidation of Mughal Empire. It also discussed about the political and religious ideas, land rights, revenue system, and trade and agricultural under the period concerned.

PSO 10: HISHC1010: The aim of this paper is to provide the under graduate students about the sources of Mughal period and its expansion. The Paper also discussed about trade network, monetary and market system along with Aurangzeb's religious policies and the decline of the empire.

PSO 11: HISHC1011: The objective of this course is to acquaint the students with various factors leading to French Revolution, development of art and culture, restoration of royal dynasty, evolution of social classes and the First World War along with administrative reorganization in Italy and Germany.

PSO 12: HISHC1012: The paper tries to analyse and disseminate the students about the transition of India into a colonial domain of the British from rural economy and society like Land Revenue system, Forest policy, famines to trade and industry such as deindustrialization and Drain of Wealth to popular peasant uprising from 1750 till Revolt of 1857.

PSO 13: HISHC1013: This Paper tries to highlight the growth of Indian nationalism and the national movement for freedom. In this regard it tries to highlight the responses of the various sections of the people. It also discussed the initial transition from the colonial to the post colonial era.

PSO 14: HISHC1014: The objective of this course is to elaborate the students about Liberal Democracy, working class movement and socialism of 19th and 20th century along with crisis of feudalism in Russia and post 1919 political, cultural and intellectual development since c.1850.

PSO 15: HISHDSE 501: The objective of this paper is to give a general outline of the history of Assam from the 13th century to the occupation of Assam by the English East India Company in the first quarter of the 19th century. It aims to acquaint the students with major stages of developments in the political, social and cultural history of the state during the most important formative period.

PSO 16: HISHDSE 502: The course aims acquainting the students with the socio-political and economic developments in Assam during the colonial regime. It also deals with the growth of nationalism and the role of the Provinces in the National Movement for independence.

PSO 17: HISHGE1: The objective of this paper is to give a general outline of the history of Assam from the 13th century to the occupation of Assam by the English East India Company in the first quarter of the 19th century. It aims to Acquaint the students with major stages of developments in the political, social and cultural history of the state history during the important formative period.

PSO18: HISHGE2: The aim of this paper is to give the students with the general outline of the history of India from the known earliest times to the coming of the Mughals to India in the first quarter of the 16th century. It is aimed at giving them a comprehensive idea of the development in all spheres of life during this period.

COURSE OUTCOME:

Course Code: HISHC101

CO 1: It covers reconstructing ancient Indian History by numismatic and epigraphic archaeological sources, multiple literary sources and approaches and interpretations.

CO 2: It covers the Palaeolithic cultures, Mesolithic cultures and developments in technology and economy.

CO 3: It covers the advent of food production and discusses about regional and chronological distribution of Neolithic culture, chalcolithic cultures and subsistence and patterns of exchange.

CO 4: This discusses about the origins, settlement patterns and town planning; agrarian base; craft productions and trade in Harappan civilization and elaborates on the social and political organization; religious beliefs and practices and art. It also covers the problem of urban decline and the late/post-Harappan traditions.

CO 5: It covers northern India (c 1500 BCE -300 BCE) and central India and Deccan (c 1000 BCE - 300 BCE). It also discusses about the culture in transition- settlement patterns, technological and economic developments; social stratification; political relations; religion and philosophy.

Course Code: HISHC102

CO 1: It covers the evolution of mankind in the Palaeolithic and Mesolithic cultures. It discusses food production with emphasis on the beginnings of agriculture and Animal husbandry within this period.

CO 2: It explores the Bronze age civilizations, their economy, social stratification, state structure and religion highlighting Mesopotamia up to the Akkadian empire, the old kingdom of Egypt and Shang of China.

CO 3: It discusses about the nomadic groups in central and west Asia from Bronze to Iron age in Anatolia and Greece and Minoan Civilization. It also covers the debate on Iron.

CO 4: It examines the slave society in Ancient Greece from origin of Slavery in Sparta and Greece and debates on Slavery. It also discusses about the agrarian economy, urbanization and trade.

CO 5: It discusses about Polis in ancient Greece and the development of democracy in Athens and Sparta; it covers the concept of citizenship and covers Greek culture with emphasis on science and philosophy, religion, art and architecture.

Course Code: HISHC103

CO 1: It discusses about the agrarian economy, the growth of urban centres in northern and central India and the Deccan as well as craft production, trade routes and coinage. It also covers the social stratification and property relations.

CO 2: It deliberates on the process of state formation and the Mauryan and post-Mauryan polities with special reference to the Kushnas, Satavahanas and Gana-Sanghas

CO 3: It covers the land grants, land rights and peasantry, urban decline and religious traditions of early India. Along with it, it discusses about the problem of urban decline: patterns of trade, currency, and urban settlements. The Gupta empire, post- Gupta polities -Pallavas, Chalukyas, and Vardhanas has also been covered.

CO 4: It deliberates on the **religion, philosophy and society(circa 300 BCE- CE 750), with emphasis on the c**onsolidation of the brahmanical tradition in relation to dharma, varnashram, purusharthas and samskaras.It examines the theistic cults (from circa 2nd century BC): Mahayana; the Puranic tradition and explores the beginnings of Tantricism.

CO 5: It delves into the cultural developments (from c 300 BCE to CE 750) and contains surveys of Sanskrit, Pali, Prakrit and Tamil literature in brief along with scientific and technical treatises. It explores the art and architecture & forms and patronage of Mauryan, post-Mauryan, Gupta and Post-Gupta era.

Course Code: HISHC104

CO 1: It introduces the Roman Empire with special prominence on slave society and agrarian economy as well as trade and urbanization in Roman Empire.

CO 2: It elaborates the religion and culture in Ancient Rome. It also delves into the crisis of the Roman Empire and discusses about the external factors responsible for the decline of Roman Empire.

CO 3: It discusses about the economic developments in Europe from the 7th- 14th centuries in relation to organization of production, towns and trade, technological developments and explores the crisis of Feudalism.

CO 4: It covers religion, culture and society in medieval Europe and explores the expansion of Christianity and development of the Catholic Church.

CO 5: It examines the societies in central Islamic lands with emphasis on the Tribal background, Ummah, caliphate state and the rise of Sultanates. It covers the religious developments: origins of Shariah, Mihna and Sufism. It also covers urbanization and trade.

Course Code: HISHC105

CO 1: It introduces the historical geography of early medieval India and discusses about the available sources like texts, epigraph and numismatic. It also covers the rise of Rajputs, Rashtrakutas, Palas and Pratiharas.

CO 2: It explores the evolution of political structures, state and administration of the Cholas, Legitimization of kingship, Brahmanas and Temples. It also covers the Arab conquest of Sindh: nature and impact and Ismaili dawah. It talks about thecauses and consequences of early Turkish invasions: Mahmud of Ghazna and Shahab-ud-Din of Ghaur.

CO 3: It elaborates on the Agrarian Structure and Social Change particularly on agricultural expansion, crops, landlords, peasants and tribes. It also examines the proliferation of castes, status of untouchables and debates on Indian feudalism.

CO 4: It covers the Trade and Commerce in India (c.750 -1206) in relation to: Inter-regional trade, Maritime trade, various forms of exchange, process of urbanization and the merchant guilds of South India.

CO 5: It covers the religious and cultural development pertaining to tantrism, puranic traditions; Buddhism and Jainism. It also discusses Islamic intellectual traditions of Al-Biruni and Al-Hujwiri. Regional languages and literature, art and architecture and the evolution of regional styles is also explored.

Course Code: HISHC106

CO 1: It introduces the theories and problems of transition from Feudalism to Capitalism in the modern west. It covers the early colonial expansion to understand the motives, voyages and explorations. The conquests of the Americas are introduced with the beginning of the era of colonization as well as introduction to mining and plantation and introduces about the African slaves.

CO 2: It covers the spread of humanism in Europe, city states of Italy, the social roots of Renaissance and Renaissance art.

CO 3: It discusses about the origins and social background of Reformation, the impact of Reformation and counter-reformation and also covers about Martin Luther, John Calvin and Huldrych Zwingli and elaborates on Anglicanism.

CO 4: It delves into economic developments of 16th century and the shift of economic balance from the Mediterranean to the Atlantic. It also covers commercial revolution, influx of American silver and the Price Revolution.

CO 5: It elaborates on the emergence of European state system, thirty years war and the rise of Absolutism in Spain, France, England and Russia.

Course Code: HISHC107

CO 1: It covers the interpretation of the Delhi Sultanate using survey of sources such as Persian tarikh tradition, Vernacular histories: Virgatha tradition and Premakhyans and Epigraphy and numismatic.

CO 2: It explores the Sultanate political structures with focus on the foundation, expansion and consolidation of the Sultanate of Delhi:The Khaljis and the Tughluqs. It elaborates on the Mongol threat and Timur's invasion, The Lodis: Conquest of Bahlul and Sikandar; Ibrahim Lodi and the battle of Panipat. It also delves into theories of kingship such as ruling elites and the sufis, ulema and the political authority as well as imperial monuments and coinage.

CO 3: It discusses about the emergence of provincial Dynasties of Vijaynagar, Bahmani and Bengal and covers the consolidation of regional identities through art, architecture and literature.

CO 4: It covers the society and economy (c.1206 - 1550)in relation to agricultural production, technology, Iqta and revenue-free grants. It also elaborates on the nature of rural society: village community and rural gentry as well as Trade and commerce in terms of monetization, market regulations, growth of urban centres as well as Inland and maritime trade.

CO 5: It delves into religion, society and culture (c.1206 - 1550) with emphasis on Sufis and Sufism: doctrines and practices, silsilas of chishtis and suhrawardis and their social roles. It also covers Bhakti movements and monotheistic traditions in South and North India - Nathpanthis, Kabir, Nanak and the Sant tradition and Women Bhaktas (Meera,Lal Ded). Sufi literature, Bhakti movements and Vernacular literature is also covered.

Course Code: HISHC108

CO1: It discuses about the 17th century European crisis in the context of society economic and political dimensions.

CO2: this unit deals with the major issues in the field of political and intellectual currents of the English Revolution.

CO3: It deals with scientific developments from the 15th – 17th century, growth of mercantilism in relation to European society and economics.

CO4: It discusses the end of absolute Monarchy and the growth of parliamentary Democracy.

CO5: this unit tries to highlights the political and economic issues of American Revolution and deals with Industrial Revolution.

Course Code: HISHC109

CO1: This unit will give an idea to the students regarding the Persian sources and the vernacular literary traditions along with the consolidation of Mughal Empire from the eve of Babur's invasion to the Sher Shah and his administrative and revenue reforms:

CO2: This unit tries to disseminate ideas on the formation of Mughal Empire under the rule of Akbar and the tactic and technologies used by him and his Administrative evolution along with revolt and resistance.

CO3: The aim of this unit is to give an idea on the incorporation of the Rajputs and others indigenous groups in the Mughal nobility and the expansion of Mughal from the North West frontier to Gujurat and the Deccan and the conquest of Bengal.

CO4: It consists of land rights and revenue system, agriculture and trade under the Mughal administration.

CO5: The unit deals with the political and religious ideals of the period concerned.

Course code: HISHC1010:

CO1: The learners will have an idea about the various sources and historiography of the Mughal period.

CO2: This unit deals with the political and cultural expansion of Sufism of the Mughal under Jahangir and Shah Jahan.

CO3: It gives an idea about the Aurangeb's religious institutions, decline of the Mughal Empire, growth of regional polities and state formation under the Rajputs and the Marathas.

CO4: the pattern of regional politics and the expansion under the peshwas of the Marathas and the decline of the Mughals.

CO5: Trade, craft, monetary and market system, urban centres and Indian ocean trade networks are deal herewith extensively.

Course code: HISHC1011:

CO1: The French Revolution and its European repercussions along with the phases and art and culture of the French Revolution.

CO2: it deals with restoration and Revolution from C.1815-1848.

CO3: The unit deals with capitalist Industrialisation and the social Economic Transformation of late 18th century to 1914.

CO4: The aim of this unit is to emphasised on the causes, courses and consequences of First World War.

CO5: Varieties of Nationalism and the remaking of states in the 19th and 20th century are deal with in this unit.

Course code: HISHC1012:

CO1: The ideas of this unit is to deal the society, economy, polity and dynamics of Expansion with special reference to Bengal, Mysore, Western India, Awadh, Punjab and Sindh in India in Mid 18th Century.

CO2: It deals with the colonial state and ideology with reference to arms, ideologies of the raj along with the Education

CO3: The unit tries to deals with the study of the rural economy with reference to the land revenue system, forest policy, Famines and change and the continuity of rural society.

CO4: The unit tries to emphasised on trade and Industry with reference to Deindustrialisation, fiscal policy, Drain of wealth and the growth of modern Industry

CO5: The unit deals with popular resistance and the peasants uprisings from 1855 to the revolt of 1857

Course code: HISHC1013:

CO1: The unit deals with cultural changes and social and Religious Reform movement

CO2: The emergence of political ideology from the formation of INC to moderate and extremist to swadeshi movement to the revolutionaries are dealt herewith extensively.

CO3: the unit try to stress on the Gandhian era after First World War to the quit India movement.

CO4: The unit emphasised on Nationalism and social groups

CO5: It focuses on the independence and partition about communalism its ideological practices.

Course Code: HISHC1014

CO1: The unit emphasised on liberal democracy, working class movements and socialism in the 19thj and 20th centuries.

CO2: It deals with the crisis of feudalism in Russia and experiments in socialism

CO3: This lesson deals with the imperialism, war and crisis from C1880 to 1939

CO4: The unit focus on political development of post 1919 from fascism and Nazism to the Second World War.

CO5: Cultural and Intellectual developments since C1850 have been dealth extensively in this unit.

COURSE CODE: HISHGE1

CO1: Sources of Ahom History

CO2: Expansion of Ahom kingdom and political development

CO3: The Ahom Mughal relations and the battle of Saraighat.

Co4: Decline of Ahom kingdom and the Burmese invasion.

CO5: Ahom Administration and its policy towards the hill tribes along with the spread of Sankardeva and the neo Vaishnavite movement.

COURSE CODE: HISGE 2

CO1: Harappa and Vedic Age.

CO2: Mahajanapadas and the Mauryan Empire

CO3: Post Mauryan period

CO4: Political development in the south and its art and architecture.

CO5: Delhi Sultanate its disintegration and the social political economic and religious condition during the period concerned.

COURSE CODE: HISGC101

CO1: Indus valley civilisation and Vedic age along with its political economic and religious condition.

CO2: Rise of Mahajanapadas and the development of Jainism and Budhism.

CO3: Background of Mauryan empire foundation and its decline along with Ashoka Dhamma are discussed thoroughly.

CO4: The Greeks, Sakas and Kushanas along with the Gupta Empire.

CO5. It discusses on the State formation in the Deccan and the south India along with elaboration on the Sangam literature and the chola kingdom.

COURSE CODE: HISGC201

CO1: It discusses about the Delhi Sultanate

CO2: Decline of Delhi Sultanate and its administration.

CO3: Its deals with the foundation of Mughal empire and its realtion with the rajput and its religious policies.

CO4: Rise of the Maratha under Shivaji and the decline of Mughal empire.

CO5: Bhakti movement,Sufism along with art and architecture in the sultanate and the Mughal period.

PROGRAMME SPECIFIC OUTCOME OF POL. SCIENCE HONOURS

DEPATMENT OF POL. SCIENCE, GARGAON COLLEGE

The following were the programme specific outcome of Political Science

PSO 1: Understanding Political Theory.

To introduce the students to the idea of political theory, its history and approaches, and an assessment of its critical and contemporary trends.

PSO 2: Constitutional Government and Democracy in India

Acquaints the students with the constitutional design of States' structure and institutions, and their actual working over time. The course traces the embodiment of some of these conflicts in constitutional provisions, and shows how these have played out in political practice. It further encourages a study of state institutions in their mutual interaction, and in interaction with the larger extra-constitutional environment.

PSO 3: Political Theory: Concepts and Debates

To familiarize the students with the basic normative concepts of political theory. This exercise is designed to encourage critical and reflective analysis and interpretation of social practices through the relevant conceptual toolkit. Further this course introduces the students to the important debates in the subject.

PSO 4: Political Process in India

This course maps the working of 'modern' institutions, premised on the existence of an individuated society, in a context marked by communitarian solidarities, and their mutual transformation thereby. It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power.

PSO 5: Introduction to Comparative Government and Politics

To familiarize students with the basic concepts and approaches to the study of comparative politics. More specifically the course will focus on examining politics in a historical framework while engaging with various themes of comparative analysis in

developed and developing countries.

PSO 6: Perspectives on Public Administration

The course provides an introduction to the discipline of public administration. This paper encompasses public administration in its historical context with an emphasis on the various classical and contemporary administrative theories. The course also explores some of the recent trends, including feminism and ecological conservation and how the call for greater democratization is restructuring public administration. The course will also attempt to provide the students a comprehensive understanding on contemporary administrative developments.

PSO 7: Perspectives on International Relations and World History

This paper seeks to equip students with the basic intellectual tools for understanding International Relations. It introduces students to some of the most important theoretical approaches for studying international relations. . It provides a fairly comprehensive overview of the major political developments and events starting from the twentieth century. Students are expected to learn about the key milestones in world history and equip them with the tools to understand and analyze the same from different perspectives. A key objective of the course is to make students aware of the implicit Euro - centricism of International Relations by highlighting certain specific perspectives from the Global South.

PSO 8: Political Processes and Institutions in Comparative Perspective

In this course students will be trained in the application of comparative methods to the study of politics. The course is comparative in both what we study and how we study. In the process the course aims to introduce undergraduate students to some of the range of issues, literature, and methods that cover comparative political.

PSO 9: Public Policy and Administration in India

The paper seeks to provide an introduction to the interface between public policy and administration in India. The essence of public policy lies in its effectiveness in translating

the governing philosophy into programs and policies and making it a part of the community living. It deals with issues of decentralization, financial management, citizens and administration and social welfare from a non-western perspective.

PSO 10:. Global Politics

This course introduces students to the key debates on the meaning and nature of globalization by addressing its political, economic, social, cultural and technological dimensions. In keeping with the most important debates within the globalization discourse, it imparts an understanding of the working of the world economy, its anchors and resistances offered by global social movements while analyzing the changing nature of relationship between the state and trans-national actors and networks. The course also offers insights into key contemporary global issues such as the proliferation of nuclear weapons, ecological issues, international terrorism, and human security before concluding with a debate on the phenomenon of global governance.

PSO 11: Classical Political Philosophy

This course goes back to Greek antiquity and familiarizes students with the manner in which the political questions were first posed. Machiavelli comes as an interlude inaugurating modern politics followed by Hobbes and Locke. This is a basic foundation course for students.

PSO 12: Indian Political Thought-I

This course introduces the specific elements of Indian Political Thought spanning over two millennia. The basic focus of study is on individual thinkers whose ideas are however framed by specific themes. The course as a whole is meant to provide a sense of the broad streams of Indian thought while encouraging a specific knowledge of individual thinkers and texts. Selected extracts from some original texts are also given to discuss in class. The list of additional readings is meant for teachers as well as the more interested students.

PSO 13: Modern Political Philosophy

Students will be exposed to the manner in which the questions of politics have been posed

in terms that have implications for larger questions of thought and existence.

PSO 14: Indian Political Thought-II

Based on the study of individual thinkers, the course introduces a wide span of thinkers and themes that defines the modernity of Indian political thought. The objective is to study general themes that have been produced by thinkers from varied social and temporal contexts. Selected extracts from original texts are also given to discuss in the class.

DISCIPLINE SPECIFIC ELECTIVES

DSC 1: Contemporary Politics in Assam

The primary aim of this paper is acquaint with the students with the politics of contemporary Assam and its neighbouring states. Moreover, being located in the Northeast region it is invariably the concern of the students to have proper understanding of the region.

DSC 2: **Human Rights in Comparative Perspective**

Course attempts to build an understanding of human rights among students through a study of specific issues in a comparative perspective. The course seeks to anchor all issues in the Indian context, and pulls out another country to form a broader comparative frame. Students will be expected to use a range of resources, including films, biographies, and official documents to study each theme.

DC3: **Public Policy in India**

This course provides a theoretical and practical understanding of the concepts and methods that can be employed in the analysis of public policy. It uses the methods of political economy to understand policy as well as understand politics as it is shaped by economic changes. The course will be useful for students who seek an integrative link to their understanding of political science, economic theory and the practical world of development and social change.

DSC 4: **India's Foreign Policy in a Globalizing World**

To teach students the domestic sources and the structural constraints on the genesis, evolution and practice of India's foreign policy. The endeavour is to highlight integral linkages between the 'domestic' and the 'international' aspects of India's foreign policy by stressing on the shifts in its domestic identity and the corresponding changes at the international level. Students will be instructed on India's shifting identity as a postcolonial state to the contemporary dynamics of India attempting to carve its identity as an 'aspiring power'.

GENERIC ELECTIVE PAPERS

GE 1: **Nationalism in India**

The purpose of this course is to help students understand the struggle of Indian people against colonialism. It seeks to achieve this understanding by looking at this struggle from different theoretical perspectives that highlight its different dimensions. The course begins with the nineteenth century Indian responses to colonial dominance in the form of reformism and its criticism and continues through various phases up to the events leading to the Partition and Independence. In the process, the course tries to highlight its various conflicts and contradictions by focusing on its different dimensions: communalism, class struggle, caste and gender questions.

GE 2: **Feminism: Theory and Practice**

The aim of the course is to explain contemporary debates on feminism and the history of feminist struggles. The course begins with a discussion on construction of gender and an understanding of complexity of patriarchy and goes on to analyze theoretical debates within feminism. The paper also covers the history of feminism in the west, socialist societies and in anti-colonial struggles. Further a gendered analysis of Indian society, economy and polity with a view to understanding the structures of gender inequalities.

GE 3: **Governance: Issues and Challenges**

This paper deals with concepts and different dimensions of governance highlighting the major debates in the contemporary times. There is a need to understand the importance of the concept of governance in the context of a globalising world, environment, administration, development. The essence of governance is explored through the various good governance initiatives introduced in India.

GE 4: Politics of Globalization

The objective of this generic elective paper is to make students from diverse background understand the process of globalization from a political perspective. This paper will create a broad understanding of the issues and processes globalization based on critical analysis of the various anchors and dimensions of globalization.

COURSE OUTCOME OF POLITICAL SCIENCE:

COURSE CODE: C 1:

CO1: Understand What is Politics: Theorizing the 'Political'

CO2: Analyse Traditions of Political Theory

CO3: Evaluate Critical and Contemporary Perspectives in Political Theory

CO4: Examine Political Theory and Practice-I:

CO5: Look into Political Theory and Practice-II

COURSE CODE: C 2:

CO1: Examine The Constituent Assembly and the Constitution

CO2: Understand Organs of Government- I

CO3: Understand Organs of Government-II

CO4: Look into Federalism

CO5: Evaluate Decentralization and Local Government.

COURSE CODE: C3:

CO1: Understand Freedom

CO2: Analyse Equality

CO3: make sense of Indispensability of Justice

CO4: Understand The Universality of Rights

CO5: Understand Major Debates

COURSE CODE: C 4:

CO1: Understand Political Parties and the Party System

CO2: Analyse Elections and Political Behaviour

CO3: Examine Regional Aspirations

CO4: Make sense of Religion, Caste and Politics

CO5: Understand The Changing Nature of the Indian State

COURSE CODE: C5:

CO1: Understanding Comparative Politics

CO2: Look into Historical context of modern Government-I

CO3: Evaluate Historical context of modern government-II

CO4: Evaluate Themes for comparative analysis-I

CO5: Analyse Themes for comparative analysis II

COURSE CODE: C6:

CO1: Look into PUBLIC ADMINISTRATION AS A DISCIPLINE

 CO2: Analyse THEORETICAL PERSPECTIVES-

CO3: Evaluate THEORETICAL PERSPECTIVES-II

CO4: Look into PUBLIC POLICY

CO5: Evaluate MAJOR APPROACHES IN PUBLIC ADMINISTRATION-

COURSE CODE: C7:

CO1: Analyse Studying International Relations

CO2: examine Theoretical Perspectives

CO3: Understand Critical Perspectives

CO4: Examine An Overview of Twentieth Century IR History

CO5: Evaluate Cold War and Post-Cold War

COURSE CODE: C8:

CO1: Understand Approaches to Studying Comparative Politics

CO2: Examine Electoral and Party System

CO3: Understand Nation-state

CO4: look into Democratization

CO5: Understand Federalism

COURSE CODE: C9:

CO1: Analyse Public Policy

CO2: Understand Decentralization

CO3: Look into Budget-

CO4: Understand Citizen and Administration Interface

CO5: Examine Social Welfare Administration

COURSE CODE: C10:

CO1: Assess Globalization: Conceptions and Perspectives

CO 2: Analyse Issues and Institutions in Global Politics

CO 3. Learn Contemporary Global Issues-I

CO 4: Comprehend Contemporary Global Issues -II

CO 5: Assess Global Shifts: Power and Governance

COURSE C11:

CO 1: Make sense of Text and Interpretation

CO 2: Look into Ancient Political Thought.

CO 3: Understand Machiavelli

CO 4: Make sense of Possessive Individualism-Hobbes

CO 5: Understand Locke

COURSE CODE: C 12:

CO 1: Learn about Traditions of Pre-colonial Indian Political Thought

CO 2: Analyse Rajadharma

CO 3: Learn about Manu:

CO 4: Assess Aggannasutta (Digha Nikaya)-

CO 5: Examine Barani

COURSE CODE: C 13:

CO 1: Look into Modernity and its discourses

CO 2: Learn about Romantics

CO 3: Assess Liberal socialist

CO 4: Examine Radicals

CO 5: Assess Radicals

COURSE CODE: C 14:

CO 1: Learn Introduction to Modern Indian Political Thought

CO 2: Understand Reformist Political Thought

CO 3: Assess Nationalist Political Thought

CO 4: Look into Thoughts for Social Change

CO 5: Analyse Thoughts of Cultural Nationalism

DISCIPLINE SPECIFIC ELECTIVES

DSC-1

CO-1: Analyse Composite state of Assam and its Dismemberment

CO-2: Look into Politics of Autonomy in Assam

CO-3: Examine Politics of Ethnicity in Assam

CO4: Understand Inter-State border disputes

CO5: Analyse Politics of Development

DSC-2A

CO-1: Understand Human Rights: Theory and Institutionalization

CO2: Look into Institutional Arrangements

CO3: Evaluate Rights in National Constitutions

CO4: Examine Issues of Human Rights

CO5: Examine Structural Violence

DSE 3A: Public Policy in India

CO1: Look into Public Policy and Analysis- Meaning and Concept

CO2: Assess State and Public Policy

CO3: Think about Political Economy and Policy: Interest Groups and Social Movements

CO4: Learn about Policy Decision-Making in India

CO5: Analyse Ideology and Policy

DSE 4A: India's Foreign Policy in a Globalizing World

U1: Understand India's Foreign Policy: From a Postcolonial State to an Aspiring Global Power

U2:Evaluate India's Relations with the USA and USSR/Russia

U3: Assess India's Engagements with China

U4: Analyse India in South Asia: Debating Regional Strategies

U5: Examine India's Negotiating Style and Strategies

GE-1A: Nationalism in India

Unit1: Assess Approaches to the Study of Nationalism in India

Unit-II: Understand Reformism and Anti-Reformism in the Nineteenth Century

Unit-III: Examine Nationalist Politics and Expansion of its Social Base

Unit-IV: Examine Social Movements

Unit V-: Learn about Partition and Independence

GE-2A: Feminism: Theory and Practice

U1: Learn about Concepts in Feminism

Unit-II: Analyse Approaches to the study of Feminism

Unit-III Look into Genesis of Feminist Movements in the West:

Unit-IV: Evaluate Genesis of Feminist Movement in the East:

Unit-V: Assess The Indian Experience:

GE-3B: Governance: Issues and Challenges

Unit-I: Look into Government and Governance

Unit-II: Learn Governance and Development

Unit-III: Assess Environmental Governance

Unit-Iv: Learn about Local Governance-

Unit-V: Analyse Good Governance Initiatives In India: Best Practices-

GE-4A: Politics of Globalization

Unit-I: Look into the Concept of Globalization:

Unit-II: Analyse International Institutions/Regimes

Unit-III: Make sense of Issues in Globalization:

Unit-IV: Learn about Globalization and democracy:

Unit-V: Learn about Issues and Challenges:

BA NON HONOURS

PROGRAMME SPECIFIC OUTCOME OF POLITICAL SCIENCE

DSC- 1 A: Introduction to Political Theory

This course aims to introduce certain key aspects of conceptual analysis in political theory and the skills required to engage in debates surrounding the application of the concepts.

DSC- 1 B: Indian Government and Politics

The course provides the students an understanding of how Indian government and politics works.

DSC- 1C: Comparative Government and Politics

It provides an understanding about the various issues of comparative government and politics.

DSC- 1D: Introduction to International Relations

This Course is designed to give students a sense of some important theoretical approaches to understand international relations; a history from 1945 onwards to the present; and an outline of the evolution of Indian foreign policy since independence and its possible future trajectory.

DSE 1A (i) : Themes in Comparative Political Theory

DSE 1A (ii): Administration and Public Policy: Concepts and Theories

It acquaints the students with the basic concepts and theories of public administration and public policy.

DSE 1B (i): Democracy and Governance

This Paper tries to explain the institutional aspects of democracy and how institutions function within a constitutional framework. It further delves into how democracy as a model of governance can be complimented by institution building.

DSE 1B (ii): Understanding Globalization

: The Purpose of this course is to give students a basic understanding of what is meant by the phenomenon of globalization, its sources and forms. In addition, students will obtain a familiarity with both key global actors and certain urgent problems that require solutions at global level.

GE 1: Reading Gandhi Course Objective: The course seeks to meet two essential objectives: one, to acquaint the students with the art of reading texts, to enable them to grasp its conceptual and argumentative structure and to help them acquire the skills to locate the texts in a broader intellectual and socio-historical context. Second, it aims to acquaint the students with the social and political thought of Gandhi. The themes in Gandhian thought that are chosen for a close reading are particularly relevant to our times

GE 2: Human Rights Gender and Environment

: This course aims at enabling the students to understand the issues concerning the rights of citizens in general and the marginalized groups in particular, and assess the institutional and policy measures which have been taken in response to the demands of various movements. Conceptual dimensions, international trends and the Indian experience form the contents of the course.

COURSE OUTCOME

DSC- 1 A: Introduction to Political Theory

U1: Students will learn about the basics of Political Theory Basics:

Unit-II: Deals with Concepts in Political Theory-I:

 Unit-III: Throws light on Concepts in Political Theory-II:

Unit-IV: Deal with Concepts in Political Theory-III:

Unit-V: Explains Debates in Political Theory: 13 Lectures and 4 Tutorials Democracy and Economic Growth

DSC- 1 B: Indian Government and Politics

Unit-I: Throws light on Approaches to the Study of Indian Politics and Nature of the State in India

Unit-II: Looks into the Indian Constitution:

Unit-III: Looks at the Power Structure in India

Unit-IV: Deals with Parties and Party Systems in India; Strategies of Development- Planned Economy and Neo-Liberalism

Unit-V: Deals with Social Movements: Workers, Peasants, Environmental and Women's Movement

DSC- 1C: Comparative Government and Politics

Unit-I: Throws light on Comparative Politics:

Unit-II: Looks into Classifications of Political Systems:

Unit-III: Provides an understanding of Electoral Systems:

 Unit- IV: Looks into Party Systems:

Unit-V: Understand Contemporary Debates on the Nature of State:

DSC- 1D: Introduction to International Relations

Unit-I: Delves into Approaches to International Relations

Unit-II: Discussion about Cold War Era Second World War and Origins of Cold War Phases of Cold War

Unit-III: Looks into Post-Cold War Era- Post Cold- War Era and Emerging Centers of Power (European Union, China, Russia and Japan)

Unit-IV: DiscussesIndia's Foreign Policy: Basic Determinants -Historical, Geo-Political, Economic, Domestic and Strategic India's Policy of Non-alignment

Unit-V: India: Looks into An Emerging Power- Situating India, India as a Military Power, Nuclear Power, Asian Power, India and the USA

DSE 1A (ii): Administration and Public Policy: Concepts and Theories

Unit-I: Enquires Public Administration as a Discipline

 Unit-II: Throws light on Major Approaches to the Study of Public Administration-

Unit-III: Looks into Administrative Theories:

Unit-IV: Provides an Understanding of Public Policy:

Unit- V: Looks into From Development Administration to New Public Management:

DSE 1B (i): Democracy and Governance

Unit –I: Looks into Structure and Process of Governance:

Unit-II: Throws light on Ideas, Interests and Institutions in Public Policy

Unit- III: Looks into Regulatory Institutions

Unit-IV: Deals with Contemporary Political Economy of Development in India

Unit-V: Provides light on Dynamics of Civil Society

DSE 1B (ii): Understanding Globalization

Unit-I: Deals with Globalization- Concepts

Unit-II :Looks into Dimensions of Globalization: Economic, Political, Technological and Cultural

Unit-III: Looks into Contemporary World Actors United Nations World Trade Organization (WTO) Group of 77 Countries (G-77)

Unit-IV: Provides light on Global Environmental Issues Global Warming

Unit-V: Looks into Contemporary Issues- Poverty and Development

GE 1: Reading Gandhi Course Objective

Unit-I: Analyse Ways to read a text: Textual Contextual

Unit-II: Evaluate Hind Swaraj: Gandhi in his own words

Unit-III: Examine Gandhi and Modern India-I Nationalism Communal Unity

Unit-IV: Looks into Gandhi and Modern India-II Women's Question Untouchability

Unit-V: Deals with Gandhi's Legacy- Anti- Racism Movements

GE 2: Human Rights Gender and Environment

Unit-I: Analyse Understanding Social Inequality

Unit-II: Examine Human Rights

Unit-III: Evaluate Human Rights in Indian Context

Unit-IV: Understand Gender

Unit-V: Understand Environment

DEPARTMENT OF SOCIOLOGY, GARGAON COLLEGE

After completing this programme, it is expected to provide the students overall sociological knowledge covering various aspects of society. They can understand scientifically and systematically about social institution, social processes, social interrelations, social interactions, social problems and prospects etc. It helps students to face not only socio-cultural situation but also socio-economic situation in their life. They can apply their sociological knowledge in various fields-

- Learners aware about scientific analysis on economy, religion, polity, etc. which help them to take social responsibility over society.

- After completing the course the students can involve in teaching profession and provide knowledge to learners.

- Students can developed research related skills that will be help to solve various types of social problems.

- Students are expected to be familiar with data collection, compilation, analysis and interpretation and writing of project reports independently.

- Students can engage in medical sector , industrial sector, defence activity, etc.

- Learners can participate in various welfare activities such as labour welfare, Women & Child welfare, welfare for weaker section etc.

- It is expected to develop effective co-ordinating skills in society through this course.

- Students get practical knowledge on society through field study and projects.

PROGRAMME SPECIFIC OUTCOME AND COURSE OUTCOME OF BA SOCIOLOGY (HONOURS):

1. **CORE COURSE- 01**

INTRODUCTION TO SOCIOLOGY – 1

Total Credit :- 6

Total Marks 80+20=100

Course Objective:

The mandate of the course is to introduce the discipline to students from diverse trainings and capabilities. The course is intended to introduce the students to a sociological way of thinking. It also provides a foundation for the other more detailed and specialized courses in sociology.

1. Sociology: Discipline and Perspective   **Marks:- 20**

1.1 Thinking Sociologically

1.2 Emergence of Sociology and Social

Anthropology

2. Sociology and Other Social Sciences   **Marks:- 20**

2.1 Sociology and Social Anthropology

2.2 Sociology & Psychology

2.3 Sociology & History.

3. Basic Concepts   **Marks:- 40**

3.1 Individual and Group: Primary, Secondary, In Group, Out Group, Reference Group, Peer

Group, Clique, Interest Group, Pressure Group.

3.2 Associations and Institutions

3.3 Culture and Society

3.4 Social Change: Meaning , Direction and Dimensions.

2. **Core Corse 02**

Sociology of India – I

Total Credit :- 6

Total Marks 80+20=100

Course Objective:

    This paper introduces the processes and modes of construction of knowledge of

India. Further, it aims to draw attention to the key concepts and institutions which

are useful for the understanding of Indian society.

1. India: An Object of Knowledge.   **Marks :-30**

1.1 The Colonial Discourse

1.2 The Nationalist Discourse

1.3 The Subaltern Critique

2. Indian Society: Concepts and Institutions   **Marks :-50**

2.1 Caste: Concept and Critique

2.2 Agrarian Classes

2.3 Industry and Labour

2.4 Tribe: Profile and Location

2.5 Village: Structure and Change

2.6 Kinship: Principle and Pattern

2.7 Religion and Society

3. **Core Course 03**

Introduction to Sociology II

Total Credit :- 6

Total Marks 80+20=100

Course Objective:

The course aims to provide a general introduction to sociological thought. The focus is on studying from the original texts to give the students a flavor of how over a period of time thinkers have conceptualized various aspects of society. This paper also provides a foundation for thinkers in the other papers.

1. Sociological Perspective   Marks 10

1.1 Functionalism: Redcliff Brown, Durkheim.   Marks 10

1.2 Interpretive Sociology : Max Weber, George Simmel   Marks 10

1.3 Conflict Perspective.:-   Karl Marx, Ralf Dahrendorf   Marks 10

1.4 Structuralism:-Edmund Leach, Claude Levi-Strauss   Marks 10

1.5 Interactionism: Herbert Blumer, Herbert Mead   Marks 10

1.6 Feminist Perspective :-Cultural Feminism, Liberal Feminism, Socialist (Marxist) Feminism,

 Radical Faminisim   Marks 10

4. **Core Course 04**

Sociology of India – II

Total Credit=6

Total Marks 80+20=100

Course Objective:

This paper aims to draw attention to the variety of ideas and debates about India. Further, it critically engages with the multiple socio-political forces and ideologies which shape the terrain of the nation.

1. Ideas of India   Marks :- 10

1.1 Gandhi : Swaraj, Ambedkar: Annihilation of Caste

1.2 Indological: G.S.Ghurey , Louis Dumont Ethnographic Approaches: M.N. Sriniwas, S.C. Dube

2.Resistance, Mobilization, Change   Marks:-   50

2.1 Dalit Politics: Dalit Identity, Dalit Politics : Caste System and Economics, Inequality

2.2 Mobility and Change: Sanskritization and Westernization

2.3 Women's Movement: Women and Patriarchy, Feminine Voice in Indian Music

2.4 Peasant Movements: Peasant Movements before and after Independence Ethnic Movements: Identity Politics –Bodo, Karbi

2.5 Ethnic Movements: Identity Politics –Bodo, Karbi

2.6 Middle Class Phenomenon: The History of Assamese Middle Class

3.Challenges to Civilization, State and Society   **Marks :-20**

3.1 Communalism: Religion and Politics in

3.2 Secularism: Secular Experience in India

3.3 Nationalism: Nation, Nationalism and Sub-nationalism.

5.   Core Course 05

POLITICAL SOCIOLOGY

Total Credit=6

Total Marks 80+20=100

Course Objective:

     This course introduces the students to some major theoretical debates and concepts in Political Sociology, while situating these within contemporary political issues. A key thrust of the paper is towards developing a comparative understanding of political relationships through themes such as power, governance and state and society relationships.

1. Contextualising the study of Political Sociology.   Marks :-15

1.1 Nature , Scope and Development of political Sociology

2. Basic Concepts   Marks:-25

2.1 Power and Authority(Max Weber and Anthony Gittens)

2.2 State, Governance and Citizenship

2.3 Elites and the Ruling Classes (Parito , Bottomore and C.W. Mills

3. Political Systems :   Marks :- 20

3.1 Segmentary

3.2 Totalitarian

3.3 Democratic

4. Everyday State, Local Structures of Power: Marks:-20

4.1 Panjichayati Raj

4.2 Autonomous Council

4.3 Development Council

6. **Core Course 06**

<u>Sociology of Religion</u>

 Total credits :- 6

Total Marks 80+20=100

Course Objective

       The course lays primacy to the understanding of religious over individual religions. Drawing heavily from classical writings on the subject it reinforces importance of the positions developed in these texts. Implicitly numerous interconnections can be at-tempted between various themes, manifestly the overarching concern of the paper is to follow up the linkage between social and religious through different registers mentioned in the outline.

1. Social and Religious   **Marks :- 40**

1.1. Formulating Religious

1.1.1 Social definitions of religion

1.1.2 Social functions of religion

1.2   Asceticism and Accumulation

1.2.1 Relationship between religion and socio economic action

1.2.2 Contradiction between asceticism and accumulation

1.3 Theodicy and Eschatology

1.3.1 Social implications of the Idea of divine Justice

1.3.2 Social implications of the idea of death and salvation

1.4. State, Religion and Emancipation

1.4.1. Religion and state

1.4.2. Religion and community

1.5. Religious and Solitude

1.5.1 The isolation of the sacred

1.5.2 The sacred community and exclusion

2. Elements of Religious   **Marks :- 20**

2.1. Sacred, Myth, Ritual (meaning and significance) (Mythology from North East India can

be used as reference for seminars and presentations as directed by the course teacher.)

2.2. Time-Space

2.2.1 Transcendence and time

2.2.2 Sacred marking of space

2.3. Rationality

2.3.1 Concept of rationality (Max Weber)

2.3.2 Rationality in religion

3. Techniques of Religious   **Marks :- 20**

3.1. Prayer

3.1.1 Techniques of Prayer

3.1.2 Prayer as a ritual

3.2Craft

3.2.1 Types of crafts

3.2.2 Functions of crafts

3.3 Body

 3.3.1 Gestures

3.3.2 Performance

7. **Core Course 07**

<u>Sociology of Gender</u>

Total Credit=6

Total Marks 80+20=100

Course Objective:

The course introduces gender as a critical sociological lens of enquiry in relation to various social fields. It also interrogates the categories of gender, sex, and sexuality.

1. Gendering Sociology   **Marks:- 15**

1.1 Sociology of Gender: An Introduction

1.2 Gender, Sex, Sexuality

1.3 Concept of Masculinity and Femininity

2.Gender Theories   **Marks:- 25**

2.1 Feminism (Liberal feminism, radical feminism and social feminism)

2.2 Marxian theory of gender

2.3 Queer theory of Gender

3.Gender: Differences and inequalities   **Marks :-20**

3.1 Gender discrimination (family, caste, class and work)

3.2 Gender and development

3.3 Gender budgeting

4.Gender, Power and resistance   **Marks:-20**

4.1 Power and subordination (Patriarchy)

4.2 Resisting and movements(LGBT movements)

8. **Core Course 08**

<u>ECONOMIC SOCIOLOGY</u>

Total Credit=6

Total Marks 80+20=100

Course Objective:

The course provides an understanding of the social and cultural bases of economic activity. It highlights the significance of sociological analysis for the study of economic processes in local and global contexts.

1. Perspectives in Economic Sociology
Marks:-20

1.1 Formalism and Substantivism

1.2 New Economic Sociology

2. Forms of Exchange **Marks:-15**

2.1 Reciprocity and Gift

2.2 Exchange and Money

3. Systems of Production, Circulation and Consumption **Marks:-30**

3.1 Hunting and Gathering

3.2 Domestic Mode of Production

3.3 Peasant

3.4 Capitalism

3.5 Socialism

4. Some Contemporary Issues in Economic Sociology **Marks :-15**

4.1 Development

4.2 Globalisation

   9. **Core Course 09**

<u>**SOCIOLOGY OF KINSHIP**</u>

Total Credit=6

Total Marks 80+20=100

Course Objective:

This course aims to introduce general principles of kinship and marriage by reference to key terms and theoretical statements substantiated by ethnographies. The course looks at the trajectories and new directions in kinship studies.

1.Introduction: **Marks :- 25**

1.1 Key Terms: Descent, Consanguinity, Filiation, Incest Taboo, Affinity, Family, Residence

1.2 Approaches:

1.2.1 Descent

1.2.2 Alliance

1.2.3 .Cultural

2.Family, Household and Marr   **Marks :- 20**

2.1 Types of Family and changes

2.2 Difference Between family and Household

2.3 Types of marriage

3.Re-casting Kinship   **Marks :-35**

3.1 Relatedness- Concept and Type

3.2 Kinship and Gender

3.3 Re-imagining Families

3.4 New Reproductive Technologies

3.4.1 Types of New Reproductive techniques

3.4.2 Social implications of New Reproductive techniques on the family system,

Representations of Kinship and Marriage in Biographies, Popular Culture and Films would be examined by students through weekly presentations and term papers.

   10. Core Course 10

Social Stratification

Total Credit=6

Total Marks 80+20=100

Course Objective:

This course introduces students to Sociological Study of Social Inequalities. It acquaints students with principal theoretical perspectives on and diverse forms of Social inequality in articulation with each other.

1.Introducing Stratification (2 weeks)   **Marks :- 25**

1.1 Definition of Social stratification

1.2 Idea of Inequality, Equality, Difference and hierarchy

1.3 Patterns of Social Stratification- Closed and Open

2.Theories of Stratification (5 Weeks)   **Marks :-15**

2.1 Marx, Weber and Class

2.2 Functionalism

3.Identities and Inequalities(5 Weeks)   **Marks :-15**

3.1 Caste, Race and Ethnicity

3.2 Feminism and Gendered Stratification

4.Mobility and Reproduction (2 Weeks)   **Marks :- 25**

4.1 Definition and types of social mobility

4.2 Concept of Social reproduction

4.3 Social Reproduction of- class and occupational categories

11. Core Course 11

Sociological Thinkers –I

Total Credit=6

Total Marks 80+20=100

Objectives:

bbbThe course introduces the students to the classics in the making of the discipline of sociology through selected texts by the major thinkers.

1.August Comte   **Marks :- 20**

1.1 Law of Human Progress1.2 Hierarchy of Sciences

1. Karl Marx   **Marks :-20**

2.1 Materialist Conception of History

2.2 Capitalist Mode of Production

3. Max Weber   **Marks :-20**

3.1 Social Action and Ideal Types

3.2 Religion and Economy

4.Emile Durkheim   **Marks :-20**

4.1 Social Fact

4.2 Individual and Society

12. **Core Course 12**

Sociological Research Methods – I

Total Credit=6

Total Marks 80+20=100

Course Objective:

The course is a general introduction to the methodologies of sociological research methods. It will provide the student with some elementary knowledge of the complexities and philosophical underpinnings of research.

1. The Logic of Social Research(weeks 1-7)   **Marks :-35**

1.1 What is Sociological Research?

(a) Research , Science and Sociology.

(b)Scientific Method : Positivist and Constructionist Interpretation of Science

(c) Trend of Sociological Research , Sociological Imagination

1.2 Objectivity in the Social Sciences

(a) Objectivity as explained by Emile Durkheim

(b)Objectivity as explained by Max Weber

1.3 Reflexivity

(a) The coming Crisis in Western Sociology –Methodological Approach

(b) A Critique to Conventional Sociology : Reflexivity (Harold Garfinkle)

2. Methodological Perspectives(weeks 8-11)   **Marks :-20**

2.1 Comparative Method

(a) Comparative Method in the works of Emile Durkheim, Max Weber and Redcliff Brown

(b) Feminist Method : Approach and Design

2.2 Feminist Method : Approach and Design

3.Modes of Enquiry(weeks 12-14)   **Marks :-30**

3.1 Theory and Research

3.2 Inductive and Deductive Logic

3.3 Quantitative and Qualitative Research : Characteristics , Purpose and Types

13. Core Course 13

Sociological Thinkers-II

Total Credit=6

Total Marks 80+20=100

Sociological Thinkers II

Course Objective:

To introduce students to post-classical sociological thinking through some original texts.

1. Talcott Parsons   **Marks :- 10**

1.1 Social Systems

2.Claude Levi-Strauss   **Marks :-10**

2.1 Structuralism

3**.G. H. Mead and Erving Goffman**   **Marks :-16**

3.1 G. H. Mead: Mind , Self and Society

3.2 Erving Goffman: Self in Everyday Life

4.Peter L. Berger and Thomas Luckmann   **Marks :-10**

4.1 Social Construction of Reality

5**.Max Horkheimer, T.W. Adorno and Herbert Marcuse**   **Marks :-24**

5.1 Max Horkheimer :Critical Social Theory

5.2 T.W. Adorno: Knowledge Industry

5.3 Herbert Marcuse: One Dimensional Man

6.Pierre Bourdieu   **Marks:- 10.**

 6.1 Theory of Practice

14. Core Course 14

Research Methods II

Total Credit=6

Total Marks 80+20=100

Course Objective:

The course is an introductory course on how research is actually done. With emphasis on formulating research design, methods of data collection, and data analysis, it will provide students with some elementary knowledge on how to conduct both, quantitative and qualitative research.

1.Doing Social Research(weeks 1-4)   **Mark's :-24**

1.1 The Process of Social Research

(a) Steps of Social Research

(b)Research Design

1.2 Concepts, Hypothesis, Research Questions

1.3 Field (Issues and Context)

1.4 Sampling

2. **Methods of Data Collection (Weeks 5-9?)**   **Mark's :-16**

2.1 Survey Methods: Sampling, Questionnaire and Interview

2.2 Observation: Participant and nonparticipant

3**. Quantitative and Qualitative Data Analysis (weeks 10-13)**   **Marks:-30**

3.1 Quantitative – Statistical Method

3.1.1 Statistical Methods: Graphical and Diagrammatic Presentation of Data (Bar diagrams, Pie-diagram, Histogram, Frequency Polygon,Smoothed frequency curve and Ogives).

3.1.2 Measures of Central Tendency (Simple Arithmetic Mean, Median and Mode).

3.1.3 Measures of Dispersion(Standard Deviation, Variance and Covariance)

3.2 Quantitative : Content Analysis, Case

4**.Research Projects (Weeks 14)**   **Marks :-10**

Field Visit and Report submission

15. Discipline Specific Elective 01

 Urban Sociology

Total Credit=6

Total Marks 80+20=100

Course Objective:

This course provides an exposure to key theoretical perspectives for understanding urban life in historical and contemporary contexts. It also reflects on some concerns of urban living while narrating the subjective experiences of urban communities. With case studies from India and other parts of the world this course will help students relate to the complexities of urban living.

1**. Introducing Urban Sociology: Urban, Urbanism and the City**   **Marks:-15**

1.1 Urban : Definition and types

1.2 Urbanism: concept of urbanism in contemporary societies

1.3 City: concept and types

2.**Perspectives in Urban Sociology**   **Marks:-20**

2.1 Ecological: (Chicago school)

2.2 Political Economy

2.3 Network (Manuel Castells)

2.4 City as Culture

3.**Movements and Settlements**   **Marks:-20**

3.1 Migration : Forms and Consequences on urban life

3.2 Community: nature of urban community and neighborhood (case studies of Indian Urban Society can be used as references as per the discretion of the course teacher)

4.**Politics of Urban Space.**   **Marks. :- 25**

4.1. Cultuo and Leisure

4.1.1 Leisure activities in urban Societies.

4.1.2 Leisure and use of urban space

4.2 Caste, Class and Gender:

4.2.1 Youth Politics in urban context

4.2.2 Politics of gendered urban space

4.2.3 Social movements in urban societies

4.2.4 Contestation of space (riots and conflicts)

16. Discipline Specific Elective 02

Agrarian Sociology

Total Credit=6

Total Marks 80+20=100

Course Objective:

This course explores the traditions of enquiry and key substantive issues in agrarian sociology. It is comparative in nature, but pays attention to Indian themes. It also introduces emerging global agrarian concerns.

1.Agrarian Societies and Agrarian Studies   Marks:-15

1.1 Agrarian Societies: Agrarian Society and its features, Peasant Society, Subculture of Peasantry

1.2 Agrarian Studies: Marxian approach of studying agrarian society

2.Key Issues in Agrarian Sociology   Marks :-20

2.1 The Agrarian Question(Marx)

2.2 The Moral Economy: Subsistence ethics and peasant economy , Rational Peasant

2.3 Agrarian Commodity Systems: Agriculture in a developing economy –Indian experience

3.Themes in Agrarian Sociology of India   Marks :-25

3.1 Labor and Agrarian Class Structure: Agrarian class structure , problems of agricultural labour

3.2 Markets, Land Reforms and Green Revolution: Peasant and Capitalist Economy , Land Tenure and Land Reform, Understanding Green Revolution

3.3 Agrarian Movements: Peasant uprisings in India in colonial period , The New Farmer's Movement in India

3.4 Caste, Gender and Agrarian Realities: Gender Analysis of Land , Dalit Agriculture Labour.

4.Agrarian Futures   Marks :-20

4.1 Agrarian Crisis: World Bank and Third World Peasant

4.2 The Global Agrarian Order :, Political Economy in the late twentieth Century.

17. Discipline Specific Elective 03

Environmental Sociology

Total Credit=6

Total Marks 80+20=100

Course Objective:

        This course is designed to introduce students to the core debates of environmental sociology, different approaches within the sub-discipline and how these approaches may be used to understand environmental issues and movements in India.

1.Envisioning Environmental Sociology   Marks :- 25

1.1 Meaning , Definition, Nature and Scope

1.2 Realist-Constructionist Debate

2.Environmental Approaches   Marks:- 25

2.1 Treadmill of Production

2.2 Ecological Modernization

2.3 Environmental Risk

2.4 Eco-feminism and Feminist Environmentalism

2.5 Political Ecology

3.Environmental Movements in India   Marks :- 30

3.1 Forest based movement – Chipko

3.2 Water based movement – Narmada

3.3 Land based movements – Anti-mining and Seed

3.4 Anti Big Dam Movements in North East India

18. Discipline Specific Elective 04

SOCIOLOGY OF WORK

Total Credit=6

Total Marks 80+20=100

Course Objective:

  The course introduces the idea that though work and production have been integral to societies through time, the origin and spread of industrialization made a distinct rupture to that link. This rupture can also be seen mirrored in the coming of sociology as a discipline that considered work as central to the study of society. Based on this premise the paper goes on to provide an outline as to how values and ideals of pluralized industrialism(s) have caused an absorbed multiple transformative shifts to the local and global social networks of the contemporary world.

1.**Interlinking Work and Industry**   Marks :-15

2.**Forms of Industrial Culture and Organizatio**   Marks :-20

2.1 Industrialism

2.2 Post Industrial Society.

2.3 Information Society.

3.Dimensions of Work   **Marks :-25**

3.1 Alienation

3.2 Gender

3.3 Unpaid work and Forced Labour: Unpaid work: - Type of unpaid work: -

1. Unpaid Domestic work Unpaid care work.

2. Effects of Unpaid Domestic work on women and on children.

3. Forced Labour: Slavery, Debt Bondage & Human Trafficking.

4 Work in the Informal Sector: **Marks :-20**

1. Street Vendors, Home based workers.

2. Social and Political Implications and Issues: Gender, Political power of agents, poverty, children & Child Labour.

5. Risk, Hazard & Disaster: Health & Safety, workplace hazards, disaster in workplace, Risk factor and its assessment.

19. Discipline Specific Elective 05

Sociology of Health and Medicine

Total Credit=6

Total Marks 80+20=100

Course Objectives:

     The course introduces students to the sociology of health, illness and medical practice by highlighting the significance of socio-cultural dimensions in the construction of illness and medical knowledge. Theoretical perspectives examine the dynamics shaping these constructions. Negotiations of health and illness are explored through ethnographies.

1. **Introduction to the Sociology of Health and Medicine**   **Marks :-25**

Origins and Development

Conceptualising Disease, Sickness and Illness ,Social and Cultural Dimensions of Illness and Medicine- Health Culture

2.Theoretical Orientations in Health and Illness.   **Marks :-30**

Political Economy

Systems Approach

Discourse and Power Feminist Approach- Women's health, Maternal and Child Health, Reproductive health.

3.Negotiating Health and Illness.   Marks. :-.   25

Medical Practices –Medical Pluralism, Alternative medicine, AYUSH Health Policy in India- Effect of international policies on Health policies.

20. Discipline Specific Elective 06

Indian sociological traditions

Total Credit=6

Total Marks 80+20=100

Course Objective:

Traditions in Indian sociology can be traced with the formal teaching of sociology as a subject in Bombay university way back in 1914. While the existence of a ―Sociology in India‖ and ―Sociology of India‖ have been largely debated in terms of whether it has been influenced by western philosophy, is there a need of indigenization etc., sociologist in India have primarily been engaged with issues of tradition and modernity, caste, tribe and gender. This paper primarily provides perspectives of key Indian sociologists on some of these issues.

1.G.S Ghurye   Marks:-16

1.1 Caste and race

1.2 City and civilization

2.D.P Mukherjee   Marks:-16

2.1 Tradition and Modernity

2.2 Middle Class

3. M.N Srinivas   Marks :- 8

3.1 Social change

4.Verrier Elwin

4.1 Tribes in India

5.B.R Ambedkar   Marks :- 16

5.1 Dalit Liberation

5.2 Views on Education

6 Leela Dube.   **Marks :-8**

6.1. Caste and Gender.

7.T.K. Oomen.   **Marks :- 8**

7.1 Social Transformation in India.

21. Discipline Specific Elective 07

<u>**Visual culture**</u>

Total Credit=6

Total Marks 80+20=100

Course Objective:

   This paper introduces the students to the construction of seeing' as a social process. Through case studies covering various visual environments, the paper allows a scope to contextualize everyday visual culture within larger social debates around power, politics, identity and resistance

Classes Tutorials Marks

1. Introduction 35

1.1 Meaning of Visual cultures and the process of Seeing

1.2 The spectacles of Modernity (Modernity to Post Modernity: The Cultural Turn)

1.3 Orientalism and Occidentalism

2. Visual Environments and Representation.   Marks :-45

2.1 Power, Knowledge and gaze of the state

2.2 Counter politics and the art of Resistance

2.3 Visual Practices and Identity Formation

2.4 Visual cultures of Everyday life

22. Discipline Specific Elective 08

<u>**Reading Ethnographies**</u>

Total Credit=6

Total Marks 80+20=100

 Course Objective:

This course encourages the student to read ethnographic texts in their entirety. Any one set of texts from the four pairs are to be chosen. Readers are relatively free to interpret the texts within the parameters mentioned below. Suggested readings can be utilized to frame specific questions while reading the ethnographic texts and writing about them. The examination, however, will be

patterned on the parameters mentioned in the outline.

(The committee of courses at the Department of Sociology may prescribe these or any other pairs of texts for any given academic year.)

1.Ethnographic Mode of Enquiry: **Marks :-25**

1.1 Ethnography: The Engaged, Firsthand Study of Society and Culture.

1.2 Detailed descriptive Account and Participant Observation

2.Constructing the Ethnographic Object: **Marks :-25**

2.1 Ethnographic Topics: Studying Places, People, or Events

2.2 Memory and Ethnography

3.Ethnographic Practices and Styles   **Marks :-30**

3.1 Common Ethnographic Conventions:

3.2 The importance of Ethnographic details

3.3 Matching Style to Audience, Subject and Analysis3.4 Ethnography of One's own Culture and Other culture: Dilemmas and challenges of value neutrality.

23. Discipline Specific Elective 09

Societies in North East India

Total Credit=6

Total Marks 80+20=100

Societies in North East India

Course Objective:

    The course aims at providing a sociological understanding of Societies in North East India. It seeks to provide a multi-dimensional understanding of North East India with respect to social, historical, political and economic dimensions. Further, this course aims to provide a sociological understanding of the specificity of world views of diverse communities along with the emerging socio economic processes of the region.

1.Understanding North East India: **Marks :- 25**

1.1 North East India as Illusive concept

1.2 Historical evolution of the region

1.3 Socio-political and economic diversities of North East India

1.4 Demographic Structure and Changing patterns

2.**Conceptual framework to study Societies in North East India:**   **Marks   :- 15**

2.1 Caste, Class and Tribe

2.2 Race, Ethnicity and Nationalism

2.3 Development and Displacement, Land Alienation

3.**Societies in North East India and their World views:**   **Marks :- 15**

3.1 Family, Marriage and Kinship

3.2 Religions, Beliefs and Customs

3.3 Tribal Mode of Production.

4.**Emerging Social Processes in North East India:**   **Marks   :- 25**

4.1 Identity Politics: Ethnic Assertions; Nationalism and Sub-nationalism in North East India.

4.2 Changing land relations: Agrarian crisis, Commoditization and Privatization of land, Land alienation and displacement

4.3 Emerging Power Structure: Role of Elite and Middle class.

4.4 Globalization and Societies of North East India.

PROGRAMME SPECIFIC OUTCOME OF B.SC. BOTANY (HONOURS)

DEPARTMENT OF BOTANY, GARGAON COLLEGE

1. The student graduating with the Degree B. Sc. (Honours) Botany should be able to acquire core competency in the subject Botany, and in allied subject areas.

2. The student will be able to identify major groups of plants and will also be able to differentiate between the lower (e.g. algae and fungi) and higher (angiosperms and gymnosperms) plants.

3. Students will be able to explain the evolution of organism and understand the genetic diversity on the earth on the basis of comparative botany methodology.

4. The students will be able to explain various processes of plants, functions, metabolism, and concepts of gene, genome and how organism's function is influenced at the cell, tissue and organ level.

5. Students will be able to understand the adaptation, development and behavior of different forms of plants.

6. Students will be able to demonstrate the experimental techniques and methods of their area of specialization in Botany.

7. The students will be able to demonstrate their knowledge in understanding research and addressing practical problems and application of various scientific methods to address different questions by formulating the hypothesis, data collection and critically analyze the data.

8. Students will be able learn the importance of team work in order to serve efficiently in the various field.

9. Students will become critical thinker and acquire problem solving capabilities.

10. Apart from the subject specific skills, generic skills, especially in botany, the program outcome would lead to gain knowledge and skills for further higher studies, competitive examinations and employment.

COURSE LEARNING OUTCOMES

The course learning outcomes are allied with program learning outcome. In course learning outcomes, the student will attain subject knowledge in terms of individual course as well as holistically.

1. Core Course I: Microbiology and Phycology: The objective of this course is to provide knowledge to the students on various forms of microbes and algae - their characteristics and economic importance.

Course Code: BC101T: Introduction to microbial world, Bacteria, Viruses, Algae (Cyanophyta, Chlorophyta, Xanthophyta, Charophyta, Phaeophyta and Rhodophyta).

Course Code: BC101P: Practical based on BC101T

2. **Core Course II: Biomolecules and Cell Biology:** The objective of this course is to expose the students on molecular organizations life and also discusses cellular and molecular processes of life.

Course Code: BC102T: Biomolecules, Bioenergetics, Enzymes, The Cell, Cell Wall, Plasma Membrane, Cell organelles, Chloroplast, Mitochondria, Peroxisomes, Endomembrane system and Cell Division.

Course Code: BC102P: Practical based on BC102T

3. **Core Course III: Mycology and Phytopathology:** The objective of this course is to expose the students on the fungal world, different fungal diseases; their economic importance etc.

Course Code: BC203T; Introduction to fungi, Chytridiomycota, Zygomycota, Ascomycota & Basidiomycota (*Saccharomyces, Aspergillus*, *Penicillium, Alternaria, Neurospora* and *Peziza Synchytrium, Rhizopus*), Allied Fungi, Oomycota (*Phytophthora* and *Albugo.*), Symbiotic Associations, Applied Mycology and Phytopathology.

Course Code: BC203P: Practical based on BC203T

4. **Core Course IV: Archegoniate:** The objective of this course is to expose the students on Bryophyte, Gymnosperms and Fossil Plants.

Course Code: BC204T: Introduction, Bryophytes, Type Studies- Bryophytes (*Riccia, Marchantia, Pellia, Porella, Anthoceros, Sphagnum ,Funaria and Polytrichum*), Type Studies- Pteridophytes (*Psilotum*, *Selaginella*, *Equisetum, Ophioglossium* and *Marselia*), Gymnosperms (*Cycas*, *Pinus* , *Ginkgo* and *Gnetum*) and Fossil plants (*Psilophyton* and *Rhynia*, Cycadeoidea and Sphenophyllum).

Course Code: BC204P: Practical based on BC204T

5. **Core Course V: Anatomy of Angiosperms:** The objective of this course is to expose the students on the structural and anatomical organizations of plant tissues and their development.

Course Code: BC305T: Introduction and scope of Plant Anatomy, Structure and Development of Plant Body, Tissues, Apical meristems, Vascular Cambium and Wood, Adaptive and Protective Systems.

Course Code: BC305P: Practical based on BC305T

6. **Core Course VI: Economic Botany:** The objective of this course is to expose the students on various economically important plants and plant products.

Course Code: BC306T: Origin of Cultivated Plants, Cereals (Wheat and Rice), Legumes (Chick Pea, Pigeon Pea And Fodder Legumes), Sources of sugars and starches (Sugar and Potato), Spices (Fennel, Saffron, Clove, Cinnamommum, Cardamom and Black Pepper), Beverages (Tea and Coffee), Sources of oils and fats (Groundnut, Coconut, Linseed, Soybean, Mustard and Coconut), Natural Rubber, Drug-yielding plants (C*inchona, Rawolfia, Andrographis, Aloe vera* and *Phyllanthus*), Timber plants (Teak, Sal, Pine and Siso), Fibers (Cotton, Coir and Jute), Aromatics and Petrocrops(*Aquilaria*, *Cymbopogon, Vetiveria, Pogostemon, Jatropha* and *Ricinus*.).

Course Code: BC306P: Practical based on BC306T

7. **Core Course VII: Genetics:** The objective of this course is to impart knowledge of the principles of heredity and different mechanisms of inheritance.

Course Code: BC307T: Mendelian genetics and its extension, Extrachromosomal Inheritance, Linkage, crossing over and chromosome mapping, Variation in chromosome number and structure, Fine structure of gene, Gene mutations, Population and Evolutionary Genetics

Course Code: BC307P: Practical based on BC307T

8. Core Course VIII: Molecular Biology: The objective of this course is to expose the students to Biological Macromolecules and various processes involved with these macromolecules.

Course Code: BC408T: Nucleic acids: Carriers of genetic information, The Structures of DNA and RNA / Genetic Material, The replication of DNA, Central dogma and genetic code, Transcription, Processing and modification of RNA, Translation

Course Code: BC408P: Practical based on BC408T

9. Core Course IX: Plant Ecology and Phytogeography: The objective of this course is to expose the students to interaction of plant with its surroundings and also the geographic distribution of different plants.

Course Code: BC409T: Introduction, Soil, Biotic interactions, Population ecology, Plant communities, Ecosystems: Structure and Function, Phytogeography

Course Code: BC409P: Practical based on BC409T

10 Core Course X: Plant Systematics: The objective of this course is to expose the students to identification, classification and nomenclature of higher plants.

Course Code: BC410T: Significance of Plant systematics, Taxonomic hierarchy, Morphology and Botanical nomenclature, Systems of classification, Biometrics, numerical taxonomy and cladistics, Phylogeny of Angiosperms, Major families of Angiosperms (Magnoliaceae, Brassicaceae, Malvaceae, Fabaceae, Cucurbitaceae, Apiaceae, Asteraceae, Lamiaceae, Euphorbiaceae, Orchidaceae, Zingiberaceae, Arecaceae, Poaceae)

Course Code: BC410P: Practical based on BC410T

11. Core Course XI: Reproductive Biology of Angiosperms: The objective of this course is to expose the students to the process and mechanisms of plant reproduction.

Course Code: BC511T: Introduction, Reproductive development, Anther and pollen biology, Ovule, Pollination and fertilization, Self incompatibility, Embryo, Endosperm and Seed, Polyembryony, apomixes and parthenocarpy.

Course Code: BC511P: Practical based on BC511T

12. Core Course XII: Plant Physiology: The objective of this course is to expose the students to different physiological processes in plant life.

Course Code: BC512T: Plant-water relations, Mineral nutrition, Nutrient Uptake, Translocation in the phloem, Plant growth regulators, Physiology of flowering, Phytochrome, Crytochromes and Phototropins

Course Code: BC512P: Practical based on BC512T

13. Core Course XIII: Plant Metabolism: The objective of this course is to expose the students to various metabolic processes involved with plant life.

Course Code: BC613T: Concept of metabolism, Carbon assimilation, Carbohydrate metabolism, Carbon Oxidation, ATP-Synthesis, Lipid metabolism, Nitrogen metabolism and Mechanisms of signal transduction.

Course Code: BC613P: Practical based on BC204T

14. Core Course XIV: Plant Biotechnology: The objective of this course is to expose the students to application of modern tools and techniques in Biology.

Course Code: BC614T: Plant Tissue Culture, Recombinant DNA technology, Gene Cloning, Methods of gene transfer, Applications of Biotechnology.

Course Code: BC614P: Practical based on BC614T

DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE):

1. DSE Course – I: Analytical Techniques in Plant Sciences: The objective of this course is to expose the students to different techniques which can be used to study different Biological processes.

Course Code: BD501T: Imaging and related techniques, Cell fractionation, Radioisotopes, Spectrophotometry, Chromatography, Characterization of Proteins and Nucleic Acids, Biostatistics.

Course Code: BD501P, DSE Course – I - Practical: Analytical Techniques in Plant Sciences

2. DSE Course – II: Bioinformatics: The objective of this course is to expose the students to the application of computation tools in solving Biological problems.

Course Code: BD502T: Introduction to Bioinformatics, Databases in Bioinformatics, Biological Sequence Databases, Sequence Alignments, Molecular Phylogeny and Applications of Bioinformatics

Course Code: BD502P, DSE Course – II - Practical: Bioinformatics

5. **DSE Course – V: Plant Breeding:** The objective of this course is to expose the students to different methods of plant improvement and breeding techniques.

Course Code: BD605T: Plant Breeding, Methods of crop improvement, Quantitative inheritance, Inbreeding Depression and Heterosis, Crop improvement and Breeding

Course Code: BD605P, DSE Course – V - Practical: Plant Breeding

8. DSE Course – VIII: Biostatistics: The objective of this course is to expose the students to different statistical tools for Biological data analysis.

Course Code: BD608T: Biostatistics, Collection of data primary and secondary, Measures of central tendency, Correlation, Statistical inference

Course Code: BD608P, DSE Course – VIII - Practical: Biostatistics

GENERIC ELECTIVE COURSES:

1. Biodiversity (Microbes, Algae, Fungi, Lichen and Archegoniate): The objective of this course is to expose the students to different forms of plant life.

GE 1: Microbes, Algae (*Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus,* and *Polysiphonia*), Fungi [*Rhizopus* (Zygomycota), *Penicillium, Alternaria* (Ascomycota), *Puccinia, Agaricus* (Basidiomycota)], Lichen, Introduction to Archegoniate, Bryophytes (*Marchantia, Funaria* and *Sphagnum*), Pteridophytes (*Cooksonia*, *Rhynia*, *Selaginella*, *Equisetum* and *Pteris*, Gymnosperms (*Cycas* and *Pinus*)

GE1 Practical: Practical based on Biodiversity

2. Plant Physiology and Metabolism: The objective of this course is to expose the students to different physiological processes in plant life and various metabolic processes involved with plant life.

GE 2: Plant-water relations, Mineral nutrition, Translocation in phloem, Photosynthesis, Respiration, Enzymes, Nitrogen metabolism, Plant growth regulators, Plant response to light and temperature

GE2 Practical: Practical based on Plant Physiology and Metabolism

3. Plant Anatomy and Embryology: The objective of this course is to expose the students to the types of plant tissues their arrangement and also to plant reproduction.

GE 3:

GE 3 Practical: Practical based on Plant Anatomy and Embryology

4. Economic Botany and Plant Biotechnology: The objective of this course is to expose the students on various economically important plants and plant products. To expose the students to application of modern tools and techniques in Biology.

GE 3: Origin of Cultivated Plants, Cereals (Wheat), Legumes (Gram and Soybean), Spices (Clove and Black Pepper), Beverages (Tea), Oils and Fats (Mustards), Fibre Yielding Plants (Cotton), Introduction to biotechnology, Plant tissue culture, Recombinant DNA Techniques

GE 3 Practical: Practical based on Economic Botany and Plant Biotechnology

5. Plant Ecology and Taxonomy: The objective of this course is to expose the students to interaction of plant life with the surroundings and also to identification, classification and nomenclature of plants.

GE 4: Introduction, Ecological factors, Plant communities, Ecosystem, Phytogeography, Introduction to plant taxonomy, Identification, Taxonomic evidences from palynology, cytology,

phytochemistry and molecular data, Taxonomic hierarchy, Classification, Biometrics, numerical taxonomy and cladistics

GE 4 Practical: Practical based on Plant Ecology and Taxonomy

SKILL ENHANCEMENT COURSE

Vermicompost Technology: The objective of this course to expose the students how and why vermicompost are prepared. They will be able to produce good quality of Vermicompost and Vermiculture, and moreover, will acquire skills for entrepreneurship.

COURSE OUTCOME:
SEC I: Basics of Vermicompost
Introduction to vermiculture: history, economic importance including environmental issues. The matter and humus cycle (product, qualities). Ground population, transformation process in organic matter. important, their value in maintenance of soil structure, role as four r's of recycling reduce, reuse, recycle, restore. The species of earthworms; local species of earthworms, choosing the right and useful earthworm. Biology of *Eisenia fetida*.:a) taxonomy anatomy, physiology and reproduction of Lumbricidae. b) Vital cycle of *Eisenia fetida*: alimentation, fecundity, annual reproducer potential and limiting factors (gases, diet, humidity, temperature, pH, light, and climatic factors). Complementary activities of auto evaluation. Biology of *Eudrilus eugeniae*: a) taxonomy anatomy, physiology and reproduction of Eudrilidae. b) Vital cycle of Eudrilus eugeniae: alimentation, fecundity, annual reproducer potential and limiting factors (gases, diet, humidity, temperature, pH, light, and climatic factors).
Complementary activities of auto-evaluation.

SEC II: Vermicompost Technology
Small scale Vermicomposting for home gardens, vermicomposting in commercial scale-vermiculture, harvest, vermicomposting harvest and processing, Nutritional composition of vermicompost, comparison with other fertilizers, Vermiwash collection, composition & use. Enemies and sickness of earthworms, frequent problems of earthworms, identification of problems and their remedies. Complementary activities of auto evaluation. Key to identify different types of earthworms, Preparation of vermibeds, maintenance of vermin compost and climatic conditions. Harvesting, packaging, transport, storage of Vermicompost and separations

PROGRAMME SPECIFIC OUTCOME OF B. Sc. CHEMISTRY (HONOURS)

DEPARTMENT OF CHEMISTRY, GARGAON COLLEGE

INORGANIC CHEMISTRY:

Semester wise Program Specific Outcome (PSO)

PSO 1: **CHEMISTRY-C-101**: To develop the basic knowledge of chemistry in relation to atomic structure, bonding, periodicity etc.

PSO 2: **CHEMISTRY-C-301**: To make the student familiar with the chemistry of s, p blocks elements, noble gases, inorganic polymers & metallurgy.

PSO 3: **CHEMISTRY-C-401:** To develop a vivid knowledge on coordination chemistry andits application extended to biological system.

PSO 4: **CHEMISTRY-DSE-501:** To develop a strong knowledge on spectroscopy, qualitativeand quantitative aspects of analysis and thermal analysis.

PSO 5**: CHEMISTRY-DSE-502**: To develop the basis knowledge of green chemistry and its future trends.

PSO 6: **CHEMISTRY-C-601:** To make familiar with various aspects of knowledge on organometallic chemistry, its application and Inorganic Reaction Mechanism.

Course Outcome (CO)

CHEMISTRY-C-101

CO 1: Sign of wave function, counter boundary and probability diagrams etc.

CO 2: Variations of orbital energy with atomic number.

CO 3: Properties of elements, atomic radii, ionic radii, size effect of ionic bond, solvation energy, covalent character of ionic bond, redox equations, principle involved in volumetric analysis etc.

CHEMISTRY-C-301

CO 1: Predict the purification of metal, study of compounds with emphasis on structure, bonding, preparation and properties.

CO 2: Real world applications, shapes etc. of noble gas.

CO 3: Structural aspects and applications of inorganic polymer.

CHEMISTRY-C-401

CO 1: Predicting metal ion present in biological systems

CO 2: Use of chelating agents in medicine.

CO 3: Quantitative aspect of ligand field and MO theory, stability of various oxidation states and emf of transition elements

CHEMISTRY-DSE-501

CO 1: The principles and applications of modern chemical instrumentation, experimental design and data analysis.

CO 2: The composition of written laboratory reports that summarize experimental procedures and the accurately present and interpret data

CO 3: Qualitative and quantitative aspect of solvent extraction, chromatographic method of analysis -TLC & HPLC

CHEMISTRY-DSE-502

Students will gain an understanding of

CO 1: Concept of green chemistry **CO**

2: Use of safer chemicals

CO 3: Concept of atom economy

CO 4: Use of green solvent

CO 5: Use of green chemistry in our day to day life

CHEMISTRY-C-601

CO 1: Basic principles involved in analysis of anions, cations solubility product, common ion effect etc.

CO 2: Inorganic reaction mechanism

CO 3: Use of Wilkinson's catalyst in industrial process of hydrogenation of alkene, gas synthesis by metal carbonyl

CO 4: Hepacity of organic ligands, 18 electron rule, Zeise's salt etc.

ORGANIC CHEMISTRY:

Semester wise Program Specific Outcome (PSO)

PSO 1: **CHEMISTRY-C-201:** To develop preliminary knowledge in basic organic chemistry, Hydrocarbons, stereochemistry & conformational analysis.

PSO 2: **CHEMISTRY-C-302:** To develop preliminary knowledge on the synthesis, properties of organic compounds of Halogen & oxygen containing Functional groups.

PSO 3: **CHEMISTRY-C-402:** To develop the knowledge on the preparation and properties of different classes nitrogen containing compounds. Emphasis is given to heterocyclic compounds of both synthetic and natural origin.

PSO 4: **CHEMISTRY-C-501:** To acquire knowledge in organic synthesis, retro synthesis, and to understand biochemistry

PSO 5: **CHEMISTRY-C-602:** To acquaint students on application of Spectroscopy (UV – visible, IR and NMR), carbohydrates, dyes and polymers.

Course Outcome (CO)

CHEMISTRY-C-201

CO1: Knowledge of basic organic chemistry, definition, classification of stereoisomerism, optical activity, absolute and relative configuration etc.

CO2: Knowledge of elimination reaction, electrophilic and nucleophilic addition.

CO 3: Relative stability of cyclic hydrocarbon, Bayer's strain theory etc.

CHEMISTRY-C-302

CO 1: The prediction of mechanism for organic reactions

CO 2: How to design synthesis of organic molecule.

CO 3: The reactivity and stability of organic molecule based on structure

CO 4: An idea of alcohols, phenols, carbonyl compounds, acids and their derivatives etc.

COURSE CODE: **CHEMISTRY-C-402**

CO 1: Reaction for preparation of Heterocyclic compounds, polynuclear hydrocarbons

CO 2: Reaction and mechanism of substitution in heterocyclic compounds.

CO 3: Methods of structure elucidation of terpenoids.

CHEMISTRY-C-501

CO 1: The chemical basis for biological phenomena and cellular structure.

CO 2: The chemical properties of amino acids co factors and sugar.

CO 3: Enzyme kinetics, chemical logic of metabolism

CO 4: Health, disease and modern medicine are all rooted in biological chemistry

CHEMISTRY-C-602

CO 1: Application of UV, IR, NMR spectroscopy, mass spectra in organic molecules

CO 2: Biological importance of carbohydrates

CO 3: Biodegradable polymer, colour and constitution of dyes and applications of different dyes.

PHYSICAL CHEMISTRY:

Semester wise Program Specific Outcome (PSO)

PSO 1: **CHEMISTRY-C-102:** To emphasize on different states of matter & their mechanical treatment.

PSO 2: **CHEMISTRY-C-202:** To develop a strong knowledge on chemical thermodynamics, their mathematical expression & application.

PSO 3: **CHEMISTRY-C-303:** To acquaint students in details on phase equillibria, chemical kinetics, catalysis and surface chemistry.

PSO 4: **CHEMISTRY-C-403:** To develop the basic knowledge on electrochemistry, variouslaws governing electro chemical process and their application.

PSO 5: **CHEMISTRY-C-502:** To make the students familiar with the various aspects of photochemistry and quantum chemistry.

Course Outcome (CO)

CHEMISTRY-C-102

CO1: Kinetic molecular model of a gas, behaviour of real gases etc.

CO2: Effect of addition of various solutes on surface tension and viscosity.

CO 3: Cleansing action of detergents.

CO 4: Nature of solid state, elementary idea of symmetry.

CO 5: Idea of solubility and solubility product of sparingly soluble salts.

CHEMISTRY-C-202

CO 1: The application of mathematical tools to calculate thermodynamic properties

CO 2: The concept of free energy change and spontaneity.

CO 3: Thermodynamics derivation of relation between Gibbs free energy of reaction and reaction quotient.

CO 4: Derive relation between the four colligative properties using chemical potential (Thermodynamics derivation)

CHEMISTRY-C-303

CO 1: Types of catalysis, Michaelis – Menten mechanism, mechanism of catalyzed reaction at solid state.

CO 2: Steady - state approximation in reaction mechanism.**CO 3**: Concept of phases, phase diagrams for systems of solid- liquid equilibria involvingeutectic, congruent and incongruent mp, solid solution etc.

CHEMISTRY-C-403

CO 1: Quantitative aspects of Faraday's laws of electrolysis

CO 2: Application of conductance measurement

CO 3: Electrical and magnetic properties of atoms and molecules

CHEMISTRY-C-502

CO 1: The difference between classical and quantum mechanics

CO 2: Qualitative treatment of hydrogen atom and hydrogen like ions.

CO 3: How to interpret spectra

CO 4: Role of photochemical reaction in biochemical processes

PROGRAMME SPECIFIC OUTCOME OF B. Sc. GEOLOGY (HONOURS)
DEPARTMENT OF GEOLOGY, GARGAON COLLEGE

After graduation the students will be able to-

PSO 1- Understand the basic knowledge of different components of Earth System, viz. lithosphere, biosphere, atmosphere and hydrosphere as well as their mutual interactions.

PSO 2- Understand the physical and chemical properties of different rock forming minerals as well as their identification in hand specimen and thin sections.

PSO 3- Understand the basic knowledge of different kinds of deformations observed in rocks and measurement of their orientation in field.

PSO 4- Understand the basic knowledge of tectonics, viz. regional and global deformations in rocks as inferred from the theory of plate tectonics.

PSO 5- Understand the basic knowledge of different types of rocks viz. igneous, sedimentary and metamorphic rocks, their origin, occurrence and geological significance.

PSO 6- Understand the basic knowledge of past living organisms and their depositional environment, different types of fossils and mode of preservation.

PSO 7- Understand the basic knowledge of geological history of the earth as inferred from rock strata and fossils.

PSO 8- Conceptualize the basics of ore forming minerals, their formation and occurrence as well as estimate the minerals reserves present in rocks. Ability to differentiate ore minerals and rock foring minerals.

PSO 9- Conceptualize the basics of major hydrographic features of global oceans, ocean circulations, waves and fundamental biogeochemical aspects of oceans. Understand the Role of the oceans in making earth habitable by regulating the thermal energy.

PSO 10- Develop critical thinking on application of different aspects of geology viz. mineralogy, structural geology, petrology and paleontology in geological mapping and exploration of minerals, coal and petroleum.

PSO 11- Develop critical thinking on application of different geophysical properties of rocks in ground water exploration.

PSO 12- Develop analytical skills in selecting appropriate sites for major engineering projects with hands on training in surveying and preparation of Maps viz. college campus map. Understanding the basic geological objectives in mega constructions to ensure Safety of the project, Durability of the project, Cost effectiveness and minimum damage to the existing ecosystem of the site

PSO 13- Develop analytical skills in interpretation of geological features in satellite images and their applications. Understanding the different types of artificial satellite, History and development of India's space science.

COURSE OUTCOME OF GEOLOGY (MAJOR)

COURSE CODE C1:

CO 1: To explore, and understand the earth as a planet,

CO 2: Develop understanding of its complex processes, past and future evolution and interaction with society.

CO 3: Provides integrated understanding of the different components of earth system viz. complex interaction among lithosphere, biosphere and atmosphere.

COURSE CODE C2:

CO 1: Understand in detail about the minerals, the basic building blocks of earth material.

CO 2: Determine the arrangement of atoms in the crystalline solids and in mineralogy.

CO 3: Understand the use and utility of mineral science in industry.

COURSE CODE C3:

CO 1: Understand the compositional heterogeneity and geochemical processes that take place in the earth.

CO 2: Understanding Primary Geochemical differentiation, Geochemical classification of elements and Geochemical cycle of the earth.

CO 3: Conceptualise the basic tool used in the geochemical exploration of economic mineral deposits.

CO 4: Develop analytical knowledge of optical mineralogy and understand its importance for identification of minerals and ores.

CO 5: Understanding the functions of polarized microscope.

COURSE CODE C4:

CO 1: To understand the history of deformation in the rocks.

CO 2: Conceptualise the deformation of the lithospheric rocks by tectonic forces.

CO 3: Understand the geodynamics of regional to global dimension.

CO 4: Conceptualise the structural control on ore localization and landscape evolution.

CO 5: Application of structural geology in the engineering geology project is enormous.

COURSE CODE C5:

CO 1: Understand the process of magma generation, evolution and volcanism.

CO 2: Understand the interaction of plate tectonics, magma generation and ore localization.

COURSE CODE C6:

CO 1: To understand the processes of formation of sediments and their transformation to sedimentary rock.

CO 2: Understand the characteristics and classifications of sedimentary rocks.

COURSE CODE C7:

CO 1: Understand the dynamic processes of the earth that has affected the pre existing rocks.

CO 2: Understand ore localization and genesis.

COURSE CODE C8:

CO 1: Understand the identification, classification and taxonomic description of past life forms as fossils.

CO 2: Conceptualise the reconstruction of paleoclimate, paleo bathymetry and paleogeography.

CO 3: Understand its use as a tool of hydrocarbon exploration.

COURSE CODE C9:

CO 1: Understand the principles of stratigraphy, viz. the order of superposition of rocks in space and time.

CO 2: Understand the Indian stratigraphy and to know distribution of different stratigraphic horizons in India and their significances.

COURSE CODE C10:

CO 1: Understand the hydrogeologic cycle, occurrences, movement and distribution of groundwater in different regions and its utility.

CO 2: Understand the origin, distribution and chemistry of sea water as well as marine flora and fauna, effect of ocean currents and controls on climatic cycles.

COURSE CODE C11:

CO 1: Provides geological and geotechnical recommendations, analysis, and design associated with human development and various types of civil structural construction.

CO 2: Understand the different methods of surveying and its application in mapping.

COURSE CODE C12:

CO 1: Understand the origin and evolution of landscapes.

CO 2: Understand the bathymetric features created by physical, chemical or biological processes operating at or near the Earth's surface.

COURSE CODE C13:

CO 1: Understand the formation and extraction of earth materials that have economic potential in the society.

CO 2: Understand the genesis, occurrences and distribution of mineral resources and its uses a raw material in mineral based industries.

COURSE CODE C14:

CO 1: Understand the acquisition of information about an object or phenomenon without making physical contact with them.

CO 2: Understand the applicability of Remote sensing and GIS as tools for geological investigation and various other purposes.

COURSE CODE DSE 1:

CO 1: Understand the origin, classification, composition, occurrence, accumulation and habitat of fossil fuels especially Coal and Petroleum with few other fuels.

COURSE CODE DSE 2:

CO 1: Understand the principles, history and development in surveying.

CO 2: Understand uses of different instruments and techniques in surveying.

CO 3: Impart knowledge on various fields based techniques- surveying, mapping and profile sections.

COURSE CODE DSE 3:

CO 1: Impart the knowledge about the Geology of the North east India, its physiographical and stratigraphical overview.

CO 2: Understand the different geological features, occurrences of different economic minerals, seismic and flood associated hazards and disasters.

COURSE CODE DSE 4:

CO 1: Understand the evolution of life through geological time- their origin, evolution in the past up to the age of the humans.

PROGRAMME SPECIFIC OUTCOME OF B. Sc. MATHEMATICS (HONOURS)

DEPARTMENT OF MATHEMATICS, GARGAON COLLEGE

After graduation the students will be able to learn-

PSO-1: C1.1 (Calculus)
After going through this course the students will be able to apply Calculus in real life problems formulate mathematical models.

PSO-2: C 1.2 (Algebra)
After going through this course the students will be able to describe various algebraic structures on sets identify the algebraic structures present in different branches of Sciences.

PSO-3: C2.1 (Real Analysis)
After going through this course the students will be able to identify the properties of the number system and be able to describe various analytical properties of the real number system.

PSO-4: C2.2 (Differential Equations)
After going through this course the students will be able to use the techniques to solve differential equations and apply these techniques in various mathematical models used in real life problems.

PSO-5: C3.1 (Theory of Real Functions)
After going through this course the students will be able to discuss limit, continuity and differentiability of real valued functions and also be able to expand functions in series and different form of remainders**.**

PSO-6: C3.2 (Group Theory I)

After going through this course the students will be able to describe various group structures on sets and also be able to indentify the group structures present in different branches of sciences.

PSO-7: C3.3 (PDE and Systems of ODE)

 After going through this course the students will be able to make mathematical formulations and their solutions of various physical problems and design mathematical models used in heat, wave. They also be able to describe the Laplace equation and their solutions.

PSO-8: C4.1 (Numerical Methods)

After going through this course the students will be able to discuss various numerical methods and interpolation formulae and apply numerical techniques for solving differential equation.

PSO-9: C4.2 (Riemann Integration and Series of Functions)

 After going through this course the students will be able to deal with Riemann integration, improper integrals and Differentiation and integration of power series.

PSO-10: C4.3 (Ring Theory and Linear Algebra I)

After going through this course the students will be able to describe various ring structures on sets and to solve the system of linear equations.

PSO-11: C5.1 (Multivariate Calculus)

After going through this course the students will be able to extend the concepts from one variable calculus to function of several variables and will be able to demonstrate the ability to think critically and solving application of real world problems involving double/ triple integrals.

PSO-12: C5.2 (Group Theory II)

After going through this course the students will be able to apply results from preliminary concepts to solve contemporary problems, they will be able to apply   in communication theory, electrical engineering, computer science and cryptography.

PSO-13: C6.1 (Metric Spaces and Complex Analysis)

After going through this course the students will be able to describe various properties of metrics paces, complex number system and its differentiation and integration.

PSO-14: C6.2 (Ring Theory and Linear Algebra II)

Students will be able to apply theorems, techniques to solve real world problems, find the matrix associated with a linear transformation with respect to given bases and can understand the relationship between operations of linear transformations and corresponding matrices.

PSO-15: DSE1.1 (Analytical Geometry)

  After going through this course the students will be able to sketch parabola, ellipse and hyperbola and solve various geometrical problems analytically.

PSO-16: DSE2.1 (Mathematical Modeling)

After going through this course the students will be able to solve differential equations and linear programming problems used in mathematical modeling manually as well as using any software.

PSO-17: DSE 3.3 (Discrete Mathematics)

After going through this course, the students should be able to explain various discrete structures and design   graph   theoretic models of real life   problems.

PSO-18: DSE 4.1 (Mathematical Methods)

After going through this course the students will be able to construct mathematical models or real world problems and solve real world problems through the studied theories.

PSO-19: GE-1.1 (Differential Calculus)

After going through this course the students will be able to differentiate functions and find tangent normal, curvature, asymptotes etc.

PSO-20: GE-2.1 (Differential Equation)

After going through this course the students will be able to describe various methods for solving differential equations.

PSO-21: GE-3.1 (Real Analysis)

After going through this course the students will be able to analyses the properties of the number line and describe various analytical properties of the real number system.

PSO-22: GE4.3 (Combinatorial Mathematics)

After going through this course you will be able to use combinatorial approach in solving algebraic problems and explain counting principles.

COURSE OUTCOME

Course Code C1: (Calculus and practical)

CO1: Introduction to different types of function such as Hyperbolic function, exponential function, sine function etc. Concavity, convexity and optimum point of

CO2: Introducing the reduction formulae such as $\int sin\, nx\, dx$ etc. Finding volume by integration, by slicing, by cylindrical shells.

CO3: Parameterizing a curve, Introduction to conic and its related concepts.

CO4: Introduction to vector function and their properties such as limits, continuity, differentiation, integration etc. Finding tangent and normal component of acceleration using vector function.

Practical: Plotting of polynomials, transcendental function and parametric curve, using any software. Basic matrix operation, Tracing of conics in Cartesian coordinates/ polar coordinates. Sketching conic sections.

Course Code C2: (Algebra)

CO1: Students learn to represent complex number in polar form and learn the De Moivre's theorem and its application**.**

CO2: Introduction to the types of function, introduction to divisibility property of number, equivalence relation and congruent. Application of mathematical induction.

CO3: Introduction to the system of linear equation and method of finding solution of a system of linear equation.

CO4: Linear transformation and matrix representation of a linear transformation. Various properties of matrix, Eigen value, Eigen function and Characteristic equation of a matrix.

Course Code C3: (Real analysis)

CO1: Algebraic and order properties of R, topological properties of R. Archimedean property, concepts of limit points and illustration of Bolzano-Weirstrass theorem.

CO2: Sequences in details along with it's properties. Basic theorems on convergency of a sequence, Bolzano Weierstrass Theorem for Sequences and Cauchy's Convergence Criterion.

CO3: Introduction to infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence, Alternating series, Absolute and Conditional convergence.

Course Code C4: (Differential Equations (with Practical)

CO1: Introduction to DE and mathematical models. Technique and method to find complete solution of a DE. Exact differential equations and integrating factors, separable equations and equations reducible to separable form.

CO2: Introduction to compartmental model, exponential decay model, lake pollution model in details.

CO3: General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian and its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients including the procedure to find its solution**.**

CO4: Equilibrium points, phase plane, analysis of predatory-prey model, epidemic model and battle model.

Practical: Plotting solution of differential equation. Testing convergency of a sequence using any online software. Study various model in a software which are discussed in theory .

Course Code C5: (Theory of Real Functions)

CO1: Introducing the idea of limits and continuity in details, Limits of functions, sequential criterion for limits. Infinite limits and limits at infinity. Continuous functions and it's properties, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity and its criteria.

CO2: Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Mean value theorem and all the theorem related to it.

CO3: All forms of Mean value theorem. Taylor's theorem with Lagrange's and Cauchy's form of remainder. Application of Taylor's theorem to convex functions, relative extrema, series expansions of exponential and trigonometric functions, $\ln(1 + x)$, $1/ax+b$ and $(1 +x) n$.

Course Code C6: (Group Theory I)

CO1: Symmetries of a square, definition and examples of Dihedral groups , permutation groups and quaternion groups (illustration through matrices), elementary properties of groups.

CO2: Subgroups with example, centralizer, normalizer, center of a group, product of two subgroups.

CO3: Properties and classification of cyclic groups. Permutation in details, alternating group, properties of cosets, Lagrange's theorem and its' consequences.

CO4: External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem for finite abelian groups.

CO5: Group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, First, Second and Third isomorphism theorems.

Course Code C7: (PDE and Systems of ODE)

CO1: Basic concepts and Definitions of PDE. First- Order Equations in details. Method of Characteristics for obtaining General Solution of Quasi Linear Equations. Non-PDE, Charpit's method & Jacobi's method, Canonical Forms. Method of Separation of Variables.

CO2: Classifications of second order linear equations as hyperbolic, parabolic or elliptic. Derivations of Heat equation, Wave equation and Laplace equation and their solutions. Reduction of second order Linear Equations to canonical forms**.**

CO3: Method of separation of variables, solving the Vibrating String Problem, Solving the Heat Conduction problem.

CO4: Systems and types of linear DE. Differential operators, basic theory of linear systems in normal form, homogeneous linear systems with constant coefficients. The method of successive approximations, the Euler method, the modified Euler method, The Runge-Kutta method upto fourth order approximation.

Practical: Plotting integral surface, solving differential equation with the method of characteristic and solving as well as plotting the solution of heat and wave equation using any programming software.

Course Code C8: (Numerical Methods (with practical))

CO1: Algorithms, Convergence, Errors: Relative, Absolute, Round off, Truncation.

CO2: Transcendental and Polynomial equations: Bisection method, Newton's method, Secant method. Rate of convergence of these methods**.**

CO3: System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis.

CO4: Interpolation BY Lagrange and Newton's methods. Finite difference operators. Gregory forward and backward difference interpolation.

C05: Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Boole's Rule. Midpoint rule, Composite Trapezoidal rule, Composite Simpson's rule.

CO6: Euler's method. Runge-Kutta methods of orders two and four.

Practical: For any CAS (Computer aided software) Data types, different operators and operator precedence, variables and constant declarations, expressions, input/output and logical expressions, control statements and loop statements, Arrays is being introduced to the students. Use of array and loop, implementing Bisection Method, Newton Raphson Method, Secant Method, RegulaiFalsi Method, LU decomposition Method, Gauss-Jacobi Method, SOR Method or Gauss-Siedel Method, Lagrange Interpolation or Newton Interpolation, Simpson's rule.

Course Code C9: (C4.2 Riemann Integration and Series of Functions)

CO1: Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability.

CO2: Riemann sum and definition of Riemann integral through Riemann sums. Riemann integrability of monotone and continuous functions and piecewise continuous function. Properties of the Riemann integral. Intermediate Value theorem for Integrals and Fundamental theorems of Calculus.

CO3: Improper integrals; Convergence of Beta and Gamma functions.

CO4: Pointwise and uniform convergence, Theorems on limit, continuity, derivability and integrability of a sequence of functions. Theorems on the continuity and derivability of the sum function of a series of functions. Cauchy criterion for uniform convergence and Weierstrass M-Test.

CO5: Limit superior and inferior. Differentiation and integration of power series, radius of convergence, Cauchy Hadamard Theorem, Abel's Theorem, Weierstrass Approximation Theorem.

Course Code C10: (Ring Theory and Linear Algebra I)

CO1: Definition and examples of rings, properties of rings, integral domains and fields, characteristic of a ring. Ideal generated by a subset of a ring, factor rings, operations on prime and maximal ideals.

CO2: Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients.

CO3: Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

CO4: Linear transformations, null space, range, rank and nullity, matrix representation and algebra of of linear transformations. Invertibility and isomorphisms, change of coordinate matrix.

Course Code C11: (Multivariate Calculus)

CO1: Limit and continuity and extrema of functions of two variables, PDE, total differentiability and sufficient condition for differentiability. Chain rule, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, method of Lagrange multipliers, constrained optimization problems, definition of vector field, divergence and curl.

CO2: Double integration, double integration, Double integrals in polar co-ordinates, Triple integrals, Triple integral. Volume by triple integrals, cylindrical and spherical co-ordinates.

CO3: Change of variables in double integrals and triple integrals. Line integrals and it's applications in mass and work. Fundamental theorem for line integrals, conservative vector fields.

CO4: Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem

Course Code C12: (Group Theory II)

CO1: Inner automorphism, automorphism groups, automorphism groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.

CO2: Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups.

CO3: Groups action, class equation and consequences, conjugacy in Sn, p-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of An for $n \geq 5$, non-simplicity tests.

Course Code C13: (Metric Spaces and Complex Analysis)

CO1: Introduction to Metric spaces. Sequences in metric spaces. Complete Metric Spaces. Concept of set neighbourhood and limit point, Cantor's theorem. Subspaces, dense sets, separable spaces.

CO2: Continuous mappings, sequential criterion and other characterizations of continuity. Uniform continuity. Homeomorphism, Contraction mappings, compactness, Banach Fixed point Theorem. Connectedness in R.

CO3: Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations and its application**.**

CO4: Analytic functions with example, exponential, logarithmic, trigonometric function. Derivatives and definite integrals of functions. Contour integrals and its examples. Cauchy integral formula.

CO5 : Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples.

CO6: Laurent series and its examples, absolute and uniform convergence of power series.

Course Code C14: (Ring Theory and Linear Algebra II)

CO1: Polynomial rings over commutative rings, division algorithm and consequences, PID , factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, unique factorization in Z[x]. Divisibility in ID, irreducibles, primes, UFD, ED.

CO2: Dual spaces, transpose of a linear transformation and its matrix in the dual basis, annihilators, Eigen spaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator.

CO3: Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessel's inequality, the adjoint and minimal solutions to systems of a linear operator, Least Squares Approximation, linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

DSE-1: (Analytical Geometry)

CO1: Techniques for sketching parabola, ellipse and hyperbola. Reflection properties of parabola, ellipse and hyperbola. Classification of quadratic equations representing lines, parabola, ellipse and hyperbola.

CO2: Spheres, Cylindrical surfaces. Illustrations of graphing standard quadric surfaces like cone, ellipsoid**.**

DSE-2: (Mathematical Modeling, including practical)

CO1: Power series solution of a DE about an ordinary point, solution about a regular singular point, Bessel's and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order**.**

C02: Monte Carlo Simulation Modeling, Generating Random Numbers, Queuing Models, Overview of optimization modeling, Linear Programming Model: geometric solution algebraic solution, simplex method, sensitivity analysis**.**

Practical: Plotting of Legendry Polynomial, Bessel function, generating random number,

automatic computation of coefficients in the series solution near ordinary points, and the Frobenius Series Method. Simulate area under a curve, simulate volume under a surface. Programming of either one of the queuing model Single server queue and Simplex method for 2/3variables using any programming software.

DSE-3: (Discrete Mathematics)

CO1: Definition, examples and basic properties of ordered sets, duality principle, lattices as ordered sets, lattices as algebraic structures, sublattices, products and homomorphisms.

CO2: Definition, examples and properties of modular and distributive lattices, Boolean algebras, minimal forms of Boolean polynomials, Quinn- McCluskey method, Karnaugh diagrams, switching circuits and applications.

CO3: Definitions, examples and basic properties of different types of graph, isomorphism of graphs, paths and Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph, travelling salesman's problem, shortest path, Dijkstra's algorithm, Floyd-Warshall algorithm.

DSE-4: (Mathematical Methode)

CO1: Fourier Series for even and odd functions, Dirichlet conditions, Half range Fourier series.

CO2: Definition existence, properties and preliminary results on Laplace transform. Laplace transform of some elementary functions, derivatives and Integrals. Shifting theorem, Change of scale property.

CO3: Inverse Laplace Transformand its property, related theorems. Convolution theorem.

CO4 : Definition of Fourier Transform and it's Inverse , Inverse theorem for Fourier transform, Fourier Sine and Fourier cosine transforms and their inversion formula, Linearity property, change of scale property , shifting property, modulation theorem, convolution theorem.

CO5: Applications of Fourier and Laplace transform: Solution of Boundary value problems and initial value problems in 1-D and 2-D cases. Solution of Laplace and Poisson equations in 2-D cases.

GE-1: (Differential Calculus)

CO1: Limit and Continuity, Types of discontinuities, Differentiability and Successive differentiation of functions , Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions.

CO2: Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves, tracing of parametric curves, tracing of curves in polar coordinates.

CO3: All the theorems related to the Mean Value theorems, Taylor's theorem, Taylor's and Maclaurin's series of sin x, log(l+x), etc. Extrema, Indeterminate forms.

GE-2: (Differential Equation)

CO1: First order exact differential equations. Integrating factors, rules to find an integrating factor.

CO2: First order higher degree equations solvable for x, y, p. Methods for solving higher-order DE. Basic theory of linear DE, Wronskian, and its properties. Solving a DE by reducing its order.

CO3: Linear homogenous and non-homogenous equations with constant coefficients, the method of variation of parameters, The Cauchy-Euler equation, Simultaneous and total differential equations.

CO4: Order and degree of PDE, Concept of linear and non-linear PDE, Formation of first order PDE, Linear PDE of first order, Lagrange's method, Charpit's method.

CO5: Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.

GE-3: (Real Analysis)

CO1: Priliminaries on sets. Real line, bounded sets, suprema and infima, properties of R, intervals. Concept of cluster points and statement of Bolzano-Weierstrass theorem.

CO2: Convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence.

CO2: Convergence criterion and tests for Infinite series. Definition and examples of absolute and conditional convergence.

CO5: Sequences and series of functions, Tests and the results of Pointwise and uniform convergence, integrability and differentiability of functions, Power series and radius of convergence.

GE-4: (Combinatorial Mathematics)

CO 1: Basic counting principles, Permutations and Combinations (with and without repetitions), Binomial theorem, Multinomial theorem, Counting subsets, Set-partitions, Stirling numbers .

CO2: Principle of Inclusion and Exclusion, Derangements, Inversion formulae.

CO3: Generating functions: Algebra of formal power series, Generating function models, Calculating generating functions, Exponential generating functions.

CO4: Model , solution of Recurrence relations, Divide and conquer relations, generating functions.

CO5: Integer partitions, Systems of distinct representatives**.**

CO6: Polya theory of counting complete discussion and its application.

CO7: Latin squares, Hadamard matrices, Combinatorial designs: t designs, BIBDs, Symmetric designs.

PROGRAMME SPECIFIC OUTCOME OF B.Sc. PHYSICS (HONOROUS)
DEPARTMENT OF PHYSICS, GARGAON COLLEGE

PSO 1: Identify a range of diverse mathematical techniques to formulate and solve a problem in basic Physics.

PSO 2: Understand the basic concepts and ideas in mechanics- e.g. motion, force and torque, mass and moment of inertia, linear and angular momentum, kinetic energy and potential energy etc. by parallel studies of linear dynamics and rotational dynamics.

PSO 3: Understand the effect of electric field on magnetic field and the effect of magnetic field on current.

PSO4: Identify and understand different phenomena due to the interaction of light with light and matter.

PSO 5: Identify a range of diverse mathematical techniques to formulate and solve a problem in basic Physics.

PSO 6: Develop knowledge on the classical laws of thermodynamics and their application.

PSO 7: Understand basic digital electronics concepts and devices.

PSO 8: Identify a range of diverse mathematical techniques/ideas to formulate, simplify and solve some problems in Physics.

PSO 9: Understand the theoretical basis for the understanding of quantum Physics as the basis for dealing with microscopic phenomena.

PSO 10: Know about the basics of semiconductor PN junction, its various types and its application to different electronic circuits.

PSO 11: Know about the development of modern Physics and the theoretical formulation of quantum mechanics.

PSO 12: Familiarize with fundamentals of Solid State Physics.

PSO 13: Understand the underlying facts in the development of classical mechanics and the advantages of its formulation over Newtonian mechanics.

PSO 14: Introduce the fundamental concepts of Astrophysics to the interested students.

PSO 15: Understand the physical and mathematical principles to provide in-depth analysis of the behavior of electricity and magnetism in matter.

PSO 16: Develop the critically thinking ability of students to understand the diverse physical phenomena.

COURSE OUTCOME

Course code: PHYSICS-C I:
CO 1: Develop the requisite mathematical skills of a student to understand the fundamental topics in Physics.
CO 2: Develop the ability of a student to critically analyze a topic.

CO3: Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics.

CO4: Demonstrate the use and importance of computational methods in Physics and enable a student to construct a Physics problem computationally.

Course code: PHYSICS-C II:
CO1: Introduce the students to the basic concepts of mechanics.

CO2: Enable the students to understand conservation laws as they are the fundamental laws of nature and will help them in realizing a crucial phenomenon of nature- symmetry.

CO3: Enable the students to understand simple harmonic oscillator as it is a unique mechanical problem and will help them to understand the advanced treatment in quantum mechanics and modern Physics.

CO4: Develop knowledge of special relativity to understand relativistic formulation of modern theories.

Course code: PHYSICS-C III:

CO1: Develop the basic theoretical knowledge as well as experimental skills of the students on electrical networking.

CO2: Train the students to handle and repair instruments based on electric and magnetic field effects.

Course code: PHYSICS-C IV:

CO1: Enable the students to analyze different phenomena due to the interaction of light with light and matter.

CO2: Train the students to use different optical instruments.

CO3: Help the students to understand various natural phenomena using different apparatus in the laboratory.

Course code: PHYSICS-C V:

CO1: Develop the requisite mathematical skills to understand some of the fundamental topics (slightly more advanced than those in Mathematical Physics I) in Physics.

CO2: Develop the ability of a student to critically analyze a topic.

CO3: Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics.

CO4: Enable a student to understand the use and importance of computational / numerical methods in Physics and enable a student to construct a Physics problem computationally.

Course code: PHYSICS-C VI:

CO1: Apply the laws of thermodynamics in real world problems.
CO2: Conduct scientific problems and experiments on thermodynamics and allied disciplines.
CO3: Demonstrate a working knowledge of the physical principles in Thermal Physics.

Course code: PHYSICS-C VII:

CO1: Identify and understand digital electronic principles and systems.

CO2: Apply the knowledge to analyze and apply digital circuits in solving circuit level problems.

CO3: Build real life applications using digital systems.

Course code: PHYSICS-C VIII:

CO1: Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics.

CO2: Enable a student to understand the use and importance of computational/ numerical methods in Physics and to construct a problem computationally.

CO3: Help a student to pursue advanced studies in Physics.

Course code PHYSICS-C IX:

CO1: Understand and appreciate the theory of modern physics.

CO2: Develop the ability to apply it in solving simple problems in Quantum Mechanics (QM), structure of atoms, Laser, and Nuclear Physics.

Course code PHYSICS-C X:

CO1: Learn the working and applications of PN junction and bipolar junction transistors (BJT).

CO2: Learn to analyze circuits containing PN junction and BJT along with the application of BJT as amplifiers and oscillators.

CO3: Develop basic knowledge of operational amplifier and its applications.

Course code PHYSICS-C XI:

CO1: Learn how to apply quantum mechanics to solve physical systems in different areas of science.

CO2: Know about the physical behavior of materials.

CO3: Learn how the scientific behavior of materials can be used for human applications.

Course code PHYSICS-C XII:

CO1: Equip a student with basic concepts of solid state Physics so that the knowledge can be applied for further development of the subject.

CO2: Enable a student to work in both theoretical and experimental aspects of solid state Physics.

CO3: Help the students in thorough learning of the concepts associated to the course through the laboratory experiments.

Course code DSE1:

CO1: Develop basic theoretical ingredients necessary to study advanced theoretical courses like quantum mechanics.

CO2: Learn a number of mathematical techniques applicable to Physics problems in different areas.

CO3: Develop knowledge of special relativity which is essential to understand the relativistic formulation of modern theories.

Course code DSE2:

CO1: Equip the students with basic knowledge of the Astrophysics.

CO2: Create interest to the subjects of Astrophysics and to pursue further higher studies in the subject concerned in future.

CO3: Develop the critically analyzing ability, which may motivate the students to solve any challenging physical problem in future.

Course code PHYSICS-C XIII:

CO1: Solve problems relevant to interfaces between media with defined boundary conditions.

CO2: Use Maxwell's equations to describe the behaviour of electromagnetic waves in vacuum as well as medium.

CO3: Describe states and methods of polarization and analyze the polarization state of a light source.

Course code PHYSICS-C XIV:

CO1: Equip the students with basic knowledge of the Statistical Mechanics and hence will be able to look critically for analyzing any physical phenomena. CO2: A qualitative discussion on nuclear models.

CO3: Enable the students to solve any challenging physical problem in statistical mechanics.

PROGRAMME SPECIFIC OUTCOME AND COURSE OUTCOME OF B.SC. STATISTICS (HONOURS)

1. Core Course:C-01: STAT-C-101: Descriptive Statistics:

Students are acquiring,

(a) Knowledge of Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.

(b) Information about various Statistical organisations in India and their functions for societal developments,

(c) Knowledge of various types of data, their organisation and evaluation of summary measures such as measures of central tendency and dispersion etc.

(d) Knowledge of other types of data reflecting quality characteristics including concepts of independence and association between two attributes,

(e) Knowledge of various descriptive measures of statistics such as measures of central tendency, dispersion, moments etc.

(f) Knowledge of correlation, rank correlation, regression analysis, regression diagnostics, partial and multiple correlations.

(g) Construction of various types of Index Numbers, weighted and unweighted methods, Consumer price Index numbers, tests for consistency of Index Numbers etc.

(h) Students are carried out various practical based on above course.

STAT-C-101- Descriptive Statistics
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30]   Credit 6

UNIT I

Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes.   10 (5L + 1T)

UNIT II

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, skewness and kurtosis, Sheppard's corrections.   20(9L + 2T)

UNIT III

Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.   10 (5L + 1T)

UNIT IV

Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth-Marshall and Fisher's. Chain index numbers, conversion of fixed based to chain-based index numbers and vice-versa. Consumer price index numbers.   10 (5L + 1T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

 List of Practical

1. Graphical representation of data.

2. Problems based on measures of central tendency.

3. Problems based on measures of dispersion.

4. Problems based on combined mean and variance and coefficient of variation.

5. Problems based on moments, skewness and kurtosis. 6. Fitting of polynomials, exponential curves. 7. Karl Pearson correlation coefficient.

8. Correlation coefficient for a bivariate frequency distribution.

9. Lines of regression, angle between lines and estimated values of variables.

10. Spearman rank correlation with and without ties.

11. Partial and multiple correlations.

12. Planes of regression and variances of residuals for given simple correlations.

13. Planes of regression and variances of residuals for raw data.

14. Calculate price and quantity index numbers using simple and weighted average of price relatives. 15. To calculate the Chain Base index numbers.

16. To calculate consumer price index number

2. Core Course:C-02: STAT-C-102: Calculus:

Upon successful completion of this course, students will be able to acquire-

a). knowledge of limit and functions, techniques of partial and total differentiation, successive differentiation, Maxima and Minima of functions, theorems on homogeneous functions, Jacobian etc.

b). knowledge of integration and definite integral, differentiation under integral, beta and gamma functions.

c). knowledge of various methods of differential equations, higher order differential equations etc.

d). knowledge of formation and solution of various type of linear partial differential equations, different cases of complimentary functions and particular integrals.

Statistics STAT C-102 – Calculus
Marks : 100 [In-Sem : 20 + End Sem. : 80]   Credit 6

UNIT I

Differential Calculus: Limits of function, continuous functions, properties of continuous functions, partial differentiation and total differentiation. Indeterminate forms: L-Hospital's rule, Leibnitz rule for successive differentiation. Euler's theorem on homogeneous functions. Maxima and minima of functions of one and two variables, constrained optimization techniques (with Lagrange multiplier) along with some problems. Jacobian, concavity and convexity, points of inflexion of function, singular points.   30 (14L+3T)

UNIT II

Integral Calculus: Review of integration and definite integral. Differentiation under integral sign, double integral, change of order of integration, transformation of variables. Beta and Gamma functions: properties and relationship between them. 20 (8L+2T)

UNIT III

Differential Equations: Exact differential equations, Integrating factors, change of variables, Total differential equations, Differential equations of first order and first degree, Differential equations of first order but not of first degree, Equations solvable for x, y, q, Equations of the first degree in x and y, Clairaut's equations. Higher Order Differential Equations: Linear differential equations of order n, Homogeneous and non-homogeneous linear differential equations of order n with constant coefficients. 20 (8L+2T)

UNIT IV:

Formation and solution of simple partial differential equations. Linear partial differential equations of first order. Non-linear partial differential equation of first order and their different forms. Charpit's method. Homogeneous & Non-homogeneous linear partial differential equations with constant coefficients. Different cases for complimentary functions and particular integrals. 10 (4L+1T)

3. Core Course:C-03: STAT-C-201: Probability and Probability Distributions:

Students will acquire- (a) ability to distinguish between random and non-random experiments, (b) knowledge to conceptualise the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem,
(c) knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments, m.g.f., c.g.f., c.f. etc.
(d) knowledge of important discrete and continuous distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric, normal, uniform, exponential, beta and gamma distributions,

(e) insight to apply standard discrete and continuous probability distributions to different situations.

STAT-C-201 Probability and Probability Distributions
Marks : 100 [In-Sem : 20 + End Sem. : 80 (Theory : 50 Practical : 30] Credit 6

UNIT I

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.   10 (5L+1T)

UNIT II

Random variables: discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations and properties of random variables, univariate transformations with illustrations. Two dimensional random variables: discrete and continuous type, joint, marginal and conditional p.m.f, p.d.f., and c.d.f., independence of variables, bivariate transformations with illustrations. 10 (5L+1T)

UNIT III

Mathematical Expectation and Generating Functions: Expectation of single and bivariate random variables and its properties. Moments and Cumulants, moment generating function, cumulant generating function and characteristic function. Uniqueness and inversion theorems (without proof) along with applications. Conditional expectations.   10 (5L+1T)

UNIT IV

Standard probability distributions: Binomial, Poisson, geometric, negative binomial, hypergeometric, uniform, normal, exponential, Cauchy, beta and gamma along with their properties and limiting/approximation cases.   20 (9L+2T)

PRACTICAL/LAB. WORK: 30   (7L = 14 Class)

List of Practical

1. Fitting of binomial distributions for n and p = q = ½.

2. Fitting of binomial distributions for given n and p.

3. Fitting of binomial distributions after computing mean and variance.

4. Fitting of Poisson distributions for given value of lambda.

5. Fitting of Poisson distributions after computing mean.

6. Fitting of negative binomial.

7. Fitting of suitable distribution.

8. Application problems based on binomial distribution.

9. Application problems based on Poisson distribution.

10. Application problems based on negative binomial distribution.

11. Problems based on area property of normal distribution.

12. To find the ordinate for a given area for normal distribution.

13. Application based problems using normal distribution.

14. Fitting of normal distribution when parameters are given.

15. Fitting of normal distribution when parameters are not given.

4. Core Course:C-04: STAT-C-202: Algebra:

Upon successful completion of this course, students will be able to acquire the knowledge of-

a. Theory of equations and solutions, fundamental theorems of algebra, vector spaces, subspaces, bases, dimension and their properties.

b. Algebra of different types of matrices and properties, Determinants of matrices, properties and applications of determinants, use of determinants in solution of system of linear equations, Applications of linear equations.

c. Rank of matrices, generalised inverse, eigen values, eigen vectors, Quadratic forms, linear orthogonal transformation etc.

STAT C- 202- Algebra
Marks: 100 [In-Sem: 20 + End Sem. : 80]   Credit 6

UNIT I

Theory of equations, statement of the fundamental theorem of algebra and its consequences. Relation between roots and coefficients or any polynomial equations. Solutions of cubic and biquadratic equations when some conditions on roots of equations are given. Evaluation of the 12 symmetric polynomials and roots of cubic and biquadratic equations. Vector spaces, Subspaces, Span of a set, Linear dependence and independence, dimension and basis, dimension theorem (without proof).   20 (8L+2T)

UNIT II

Algebra of matrices - Types of Matrices: triangular, symmetric and skew symmetric matrices, idempotent matrices, Hermitian and skew Hermitian matrices, orthogonal matrices, singular and non-singular matrices related results and their properties. Trace of a matrix, unitary, involutory and nilpotent matrices.   15 (6L+1T)

UNIT III

Determinants of Matrices: Definition, properties and applications of determinants for 3rd and 4th orders, evaluation of determinants of order 3 and 4 using transformations. Symmetric and Skew symmetric determinants, Circulant determinants and Vandermonde determinants for nth order, Jacobi's Theorem, product of determinants. Adjoint and inverse of a matrix and related properties. Use of determinants in solution to the system of linear equations, row reduction and echelon forms, the matrix equations AX=B, solution sets of linear equations, linear independence, Applications of linear equations, inverse of a matrix.   30 (14L+3T)

UNIT IV

Rank of a matrix, row-rank, column-rank, standard theorems on ranks, rank of the sum and the product of two matrices. Generalized inverse (concept with illustrations). Partitioning of matrices and simple properties. Characteristic roots and Characteristic vector, useful Properties of characteristic roots, Cayley Hamilton theorem, Quadratic forms definition and classifications; Linear orthogonal transformation and their diagonalization.   15 (6L+1T)

5. Core Course:C-05: STAT-C-301: Sampling Distribution:

After completing the course, the students will acquire-

(a) The concept of convergence in probability and law large numbers and their uses.

(b) Concept of central limit theorem and its uses in statistics and concept of order statistics.

(c) concept of random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions,

(d) knowledge about important inferential aspects of test of hypotheses and associated concepts,

(e) knowledge about inferences from large sample test, use of CLT for testing single and difference of two proportions etc.

(f) knowledge about exact sampling distributions of Chi-square, Student's-t and Snedecor's-F and derivation of their p.d.f's, tests of significance and confidence intervals based on the distributions.

STAT-C-301 Sampling Distributions
Marks : 100 [In-Sem : 20 + End Sem. : 80 (Theory : 50 Practical : 30]   Credit 6

UNIT I

Limit laws: convergence in probability, almost sure convergence, convergence in mean square and convergence in distribution and their inter relations, Chebyshev's inequality, W.L.L.N., S.L.L.N. and their applications, De-Moivre Laplace theorem, Central Limit Theorem (C.L.T.) for i.i.d. variates, applications of C.L.T. and Liapunov Theorem (without proof).

    Order Statistics: Introduction, distribution of the rth order statistic, smallest and largest order statistics. Joint distribution of rth and sth order statistics, distribution of sample median and sample range.

12 (6L+1T)

UNIT II

Definitions of random sample, parameter and statistic, sampling distribution of a statistic, sampling distribution of sample mean, standard errors of sample mean, sample variance and sample proportion. Null and alternative hypotheses, level of significance, Type I and Type II errors, their probabilities and critical region. Large sample tests, use of CLT for testing single proportion, difference of two proportions, single mean, difference of two means, standard deviation and difference of standard deviations by classical and p-value approaches.

14 (8L+1T)

UNIT III

Exact sampling distribution: Definition and derivation of p.d.f. of $\chi2$ with n degrees of freedom (d.f.) using m.g.f., nature of p.d.f. curve for different degrees of freedom, mean, variance, m.g.f., cumulant generating function, mode, additive property and limiting form of $\chi2$ distribution. Tests of significance and confidence intervals based on distribution.

12 (6L+1T)

UNIT IV*

Exact sampling distributions: Student's and Fishers t-distribution, Derivation of its p.d.f., nature of probability curve with different degrees of freedom, mean, variance, moments and limiting form of t distribution. Snedecore's F-distribution: Derivation of p.d.f., nature of p.d.f. curve with different degrees of freedom, mean, variance and mode. Distribution of 1/F (n1, n2). Relationship between t, F and $\chi2$ distributions. Test of significance and confidence Intervals based on t and F distributions.

[*only Central distributions]   12(6L+1T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

List of Practical

1. Testing of significance and confidence intervals for single proportion and difference of two proportions

2. Testing of significance and confidence intervals for single mean and difference of two means and paired tests.

3. Testing of significance and confidence intervals for difference of two standard deviations.

4. Exact Sample Tests based on Chi-Square Distribution.

5. Testing if the population variance has a specific value and its confidence intervals.

6. Testing of goodness of fit.

7. Testing of independence of attributes.

8. Testing based on 2 X 2 contingency table without and with Yates' corrections.

9. Testing of significance and confidence intervals of an observed sample correlation coefficient.

10. Testing and confidence intervals of equality of two population variances.

The students shall get,

(a) basic knowledge of complete enumeration and sample, sampling frame, sampling distribution, sampling and non-sampling errors, principal steps in sample surveys, limitations of sampling etc.,

(b) introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.

(c) an idea of conducting the sample surveys and selecting appropriate sampling techniques, (d) knowledge about comparing various sampling techniques.

STAT-C-302 Survey Sampling and Indian Official Statistics
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory : 50 Practical : 30] Credit 6

UNIT I

Concept of population and sample, complete enumeration versus sampling, sampling and non-sampling errors. Types of sampling: non-probability and probability sampling, basic principle of sample survey, simple random sampling with and without replacement, definition 15 and procedure of selecting a sample, estimates of: population mean, total and proportion, variances of these estimates, estimates of their variances and sample size determination.   15 (8L+1T)

UNIT II

Stratified random sampling: Technique, estimates of population mean and total, variances of these estimates, proportional and optimum allocations and their comparison with SRS. Practical difficulties in allocation, estimation of gain in precision. Systematic Sampling: Technique, estimates of population mean and total, variances of these estimates (N=nxk). Comparison of systematic sampling with SRS and stratified sampling in the presence of linear trend and corrections.   15 (8L+1T)

UNIT III

Introduction to Ratio and regression methods of estimation, first approximation to the population mean and total (for SRS of large size), variances of these estimates and estimates of these variances, variances in terms of correlation coefficient for regression method of estimation and their comparison with SRS. Cluster sampling (equal clusters only) estimation of population mean and its variance, comparison (with and without randomly formed clusters). Relative efficiency of cluster sampling with SRS in terms of intra class correlation. Concept of sub sampling.

10 (5L+1T)

UNIT IV

Present official statistical system in India, Methods of collection of official statistics, their reliability and limitations. Role of Ministry of Statistics & Program Implementation (MoSPI), Central Statistical Office (CSO), National Sample Survey Office (NSSO), and National Statistical Commission. Government of India's Principal publications containing data on the topics such as population, industry and finance. 10 (5L+1T)

PRACTICAL/LAB. WORK: *30 (7L = 14 Class)*

List of Practical

1. To select an SRS with and without replacement.

2. For a population of size 5, estimate population mean, population mean square and population variance. Enumerate all possible samples of size 2 by WR and WOR and 16 establish all properties relative to SRS.

3. For SRSWOR, estimate mean, standard error, the sample size

4. Stratified Sampling: allocation of sample to strata by proportional and Neyman's methods Compare the efficiencies of above two methods relative to SRS

5. Estimation of gain in precision in stratified sampling.

6. Comparison of systematic sampling with stratified sampling and SRS in the presence of a linear trend.

7. Ratio and Regression estimation: Calculate the population mean or total of the population. Calculate mean squares. Compare the efficiencies of ratio and regression estimators relative to SRS.

8. Cluster sampling: estimation of mean or total, variance of the estimate, estimate of intra-class correlation coefficient, efficiency as compared to SRS.

7. Core Course:C-07: STAT-C-303: Mathematical Analysis:

This course will enable the students to:

(a). Understand many properties of the real numbers as points on the line and the set of real numbers as complete ordered field, recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence, apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

(b). Review of limit, continuity and differentiability, Rolle's and Lagrange's Mean Value Theorem, Taylor's Theorem, Cauchy's form of remainder, Tailor's and Maclarin's series expansion of sinx, cosx, log(1+x) etc.

(c). Obtain numerical solutions of algebraic and transcendental equations, find numerical solutions of system of linear equations and check the accuracy of the solutions, Learn about various interpolating and extrapolating methods, various rule of Numerical Integration and apply various numerical methods in real life problems.

STAT C- 303- Mathematical Analysis
Marks: 100 [In-Sem: 20 + End Sem. : 80]   Credit 6

UNIT-I

Real Analysis: Representation of real numbers as points on the line and the set of real numbers as complete ordered field. Bounded and unbounded sets, neighbourhoods and limit points, Supremum and infimum, derived sets, open and closed sets, sequences and their convergence, limits of some special sequences such as and Cauchy's general principle of 17 convergence,

Cauchy's first theorem on limits, monotonic sequences, limit superior and limit inferior of a bounded sequence.   20 (8L+2T)

UNIT-II

Infinite series, positive termed series and their convergence, Comparison test, D'Alembert's ratio test, Cauchy's nth root test, Raabe's test. Gauss test, Cauchy's condensation test and integral test (Statements and Examples only). Absolute convergence of series, Leibnitz's test for the convergence of alternating series, Conditional convergence. Indeterminate form, L' Hospital's rule.   20 (8L+2T)

UNIT-III

Review of limit, continuity and differentiability, uniform Continuity and boundedness of a function. Rolle's and Lagrange's Mean Value theorems. Taylor's theorem with Lagrange's and Cauchy's form of remainder (without proof). Taylor's and Maclaurin's series expansions of sinx, cosx, log (1+x).   20 (8L+2T)

UNIT-IV

Numerical Analysis: Factorial, finite differences and interpolation. Operators, E and divided difference. Newton's forward, backward and divided differences interpolation formulae. Lagrange's interpolation formulae. Numerical integration. Trapezoidal rule, Simpson's one-third rule, three-eighth rule, Weddle's rule with error terms. Difference equations of first order and their solutions. Solution of Transcendental equations with NR method.   20 (8L+2T)

8. Core Course:C-08: STAT-C-401: Statistical Inference:

This course will enable the students to acquire the knowledge of -
[a]. Concepts of estimation, Factorization Theorem, MVUE, Rao-Blackwell and Lehmann-Scheffe theorems and their applications, statement and application of Cramer-Rao inequality and MVB estimators.

[b]. Various methods of estimation, Principles of test of significance, most powerful test, UMP test, Neyman Pearson Lemma, Likelihood ratio test and properties etc.

[c]. SPRT for simple vs simple hypotheses. Fundamental relations among α, β, A and B, & determination of A and B, derivation of operating characteristics (OC) and average sample number (ASN) functions and examples.

STAT-C-401 Statistical Inference
Marks: 100 [In-sem : 20 + End Sem. : 80 (Theory : 50 Practical : 30]   Credit 6

UNIT I

Estimation: Concepts of estimation, unbiasedness, sufficiency, consistency and efficiency. Factorization theorem. Complete statistic, Minimum variance unbiased estimator (MVUE), Rao-Blackwell and Lehmann-Scheffe theorems and their applications. Cramer-Rao inequality and MVB estimators (statement and applications).   15 (8L+1T)

UNIT II

Methods of Estimation: Method of moments, method of maximum likelihood estimation, method of minimum Chi-square, basic idea of Bayes estimators.   8 (4L+1T)

UNIT III

Principles of test of significance: Null and alternative hypotheses (simple and composite), Type-I and Type-II errors, critical region, level of significance, size and power, best critical region, most powerful test, uniformly most powerful test, Neyman Pearson Lemma (statement and applications to construct most powerful test). Likelihood ratio test, properties of likelihood ratio tests (without proof).   15 (8L+1T)

UNIT IV

Sequential Analysis: Sequential probability ratio test (SPRT) for simple vs simple hypotheses. Fundamental relations among α, β, A and B, determination of A and B in practice. Wald's fundamental identity (sans proof) and the derivation of operating characteristics (OC) and average sample number (ASN) functions, examples based on normal, Poisson, binomial and exponential distributions.   12 (6L+1T)

List of Practical

1. Unbiased estimators (including unbiased but absurd estimators)

2. Consistent estimators, efficient estimators and relative efficiency of estimators.

3. Cramer-Rao inequality and MVB estimators

4. Sufficient Estimators –Factorization Theorem, Rao-Blackwell theorem, Complete Sufficient estimators

5. Lehman-Scheffe theorem and UMVUE

6. Maximum Likelihood Estimation

7. Asymptotic distribution of maximum likelihood estimators

8. Estimation by the method of moments, minimum Chi-square

9. Type I and Type II errors

10. Most powerful critical region (NP Lemma)

11. Uniformly most powerful critical region

12. Unbiased critical region

13. Power curves

14. Likelihood ratio tests for simple null hypothesis against simple alternative hypothesis

15. Likelihood ratio tests for simple null hypothesis against composite alternative hypothesis

16. Asymptotic properties of LR tests

17. SPRT procedure

18. OC function and OC curve

19. ASN function and ASN curve

9. Core Course:C-09: STAT-C-402: Linear Models:

The learning outcomes associated with this course are aimed at students being able -

[a]. To know the theoretical foundation of applied linear modelling, starting with the univariate models with Gauss Markov set-up, Estimability of linear parametric functions and Method of Least Squares

[b]. To know extensions to applied simple and multiple regression (Matrix & Scaler versions), Estimation and Hypothesis Testing.

[c]. Analysis of Variance of fixed, random and mixed effect models, ANOVA and ANCOVA in one way and two-way classified data for fixed effect model.

[d]. Model checking, prediction from a fitted model, Violation of assumptions of normality, collinearity etc.

STAT-C-402 Linear Models
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30]   Credit 6

UNIT I

Gauss-Markov set-up: Theory of linear estimation, Estimability of linear parametric functions, Method of least squares, Gauss-Markov theorem, Estimation of error variance.

10 (5L+1T)

UNIT II

Regression analysis: Simple regression analysis, Estimation and hypothesis testing in case of simple and multiple regression models (Matrix and scalar versions) and estimation.

10 (5L+1T)

UNIT III

Analysis of variance: Definitions of fixed, random and mixed effect models, analysis of variance and covariance in one-way classified data for fixed effect models, analysis of variance and covariance in two-way classified data with one observation per cell for fixed effect models.

20 (9L+2T)

UNIT IV

Model checking: Prediction from a fitted model, Violation of usual assumptions concerning normality, Homoscedasticity and collinearity, Diagnostics using quantile-quantile plots.

10 (5L+1T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

List of Practical

1. Estimability when X is a full rank matrix and not a full rank matrix

2. Distribution of Quadratic forms

3. Simple Linear Regression

4. Multiple Regression

5. Tests for Linear Hypothesis

6. Bias in regression estimates

7. Lack of fit

8. Orthogonal Polynomials

9. Analysis of Variance of a one-way classified data

10. Analysis of Variance of a two-way classified data with one observation per cell

11. Analysis of Covariance of a one-way classified data

12. Analysis of Covariance of a two-way classified data

10. Core Course:C-10: STAT-C-403: Statistical Quality Control:

After pursuing this course of SQC the students understand-

[a]. The concepts underlying statistical quality control and to develop their ability to apply those concepts to the design and management of quality control processes in industries. Major topics include history and overview of the state of the art of quality control methodologies, tools for descriptive and predictive statistical analysis, design and use of various control charts for quality control, process characterization and capability analysis, acceptance sampling and continuous improvement.

[b]. Acceptance Sampling Plan, Single and Double Sampling Plan and their OC, AQL, LTPD, AOQ, ASN, ATI functions with graphical interpretation etc.

[c]. Introduction of Six-Sigma Methodology, TQM, DMAIC, VOC etc.

The emphasis will be on ensuring that the students gain both a broad perspective of quality control as well as the technical skills necessary to implement quality control in any industrial setting.

STAT-C-403- Statistical Quality Control
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Quality: Definition, dimensions of quality, historical perspective of quality control and improvements starting from World War II, historical perspective of Quality Gurus and Quality Hall of Fame. Quality system and standards: Introduction to ISO quality standards, Quality registration. Statistical Process Control - Seven tools of SPC, chance and assignable Causes of quality variation. Statistical Control Charts- Construction and Statistical basis of 3- σ Control charts, Rational Sub-grouping.   15 (6L+2T)

UNIT II

Control charts for variables: X-bar & R-chart, X-bar & s-chart. Control charts for attributes: np-chart, p-chart, c-chart and u-chart. Comparison between control charts for variables and control charts for attributes. Analysis of patterns on control chart, estimation of process capability

15 (6L+2T)

UNIT III

Acceptance sampling plan: Principle of acceptance sampling plans. Single and Double sampling plan their OC, AQL, LTPD, AOQ, AOQL, ASN, ATI functions with graphical interpretation, use and interpretation of Dodge and Romig's sampling inspection plan tables.

10 (5L+1T)

UNIT IV

Introduction to Six-Sigma: Overview of Six Sigma, Lean Manufacturing and Total Quality Management (TQM). Organizational Structure and Six Sigma training plans- Selection Criteria for Six-Sigma roles and training plans. Voice of customers (VOC): Importance and VOC data collection. Critical to Quality (CTQ). Introduction to DMAIC using one case study: Define Phase, Measure Phase, Analyse Phase, Improve Phase and Control Phase.   10 (5L+1T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

List of Practical

1. Construction and interpretation of statistical control charts

* X-bar & R-chart

* X-bar & s-chart

*np-chart

*p-chart

*c-chart

*u-chart

2. Single sample inspection plan: Construction and interpretation of OC, AQL, LTPD, ASN, ATI, AOQ, AOQL curves

3. Calculation of process capability and comparison of 3-sigma control limits with specification limits.

4. Use a case study to apply the concept of six sigma application in DMAIC: practical application.

11.CoreCourse:C-11:STAT-C-501: Stochastic Processes and Queuing Theory:

The students will learn to

[a]. Get acquainted with the main types of stochastic processes, with the basic notions in stochastic processes, such as stationarity, be able to study the most important properties of stochastic processes.

[b]. Get acquainted with more detailed knowledge about Markov chain, Transition Probability Matrix, Classification of states and chains, order of Markov Chain, higher transition probabilities, Poisson processes and birth and death processes, Inter-Arrival time.

[c] Know about queueing systems, Steady state distributions, Queuing Model, M/M/1 with finite and infinite system capacity, Waiting time distribution.

STAT-C-501-Stochastic Processes and Queuing Theory
Marks: 100 [In-Sem : 20 + End Sem.: 80 (Theory : 50 Practical : 30] Credit 6

UNIT I

Probability Distributions: Generating functions, Bivariate probability generating function. Stochastic Process: Introduction, Stationary Process. 10 (5L+1T) UNIT II Markov Chains: Definition of Markov Chain, transition probability matrix, order of Markov chain, Markov chain

as graphs, higher transition probabilities. Generalization of independent Bernoulli trials, classification of states and chains, stability of Markov system, graph theoretic approach.

20 (9L+2T)

UNIT III

Poisson Process: postulates of Poisson process, properties of Poisson process, inter-arrival time, pure birth process, Yule Furry process, birth and death process, pure death process.

10 (5L+1T)

UNIT IV

Queuing System: General concept, steady state distribution, queuing model, M/M/1 with finite and infinite system capacity, waiting time distribution in stationary cases only (without proof).

10 (5L+1T)

PRACTICAL/LAB. WORK 30 (7L = 14 Class)

 List of Practical

1. Calculation of transition probability matrix

2. Identification of characteristics of reducible and irreducible chains.

3. Identification of types of classes

4. Identification of ergodic transition probability matrix

5. Stationarity of Markov chain and graphical representation of Markov chain

6. Computation of probabilities in case of generalizations of independent Bernoulli trials

7. Calculation of probabilities for given birth and death rates and vice versa

8. Calculation of probabilities for Birth and Death Process.

9. Calculation of probabilities for Yule Furry Process

10. Computation of inter-arrival time for a Poisson process.

11. Calculation of Probability and parameters for (M/M/1) model and change in behaviour of queue as N tends to infinity.

12. Calculation of generating function and expected duration for different amounts of stake. 13. Computation of probabilities and expected duration between players.

12.CoreCourse:C-12:STAT-C-502:

Statistical Computing using C Programming:

This course will enable the students to understand and apply the programming concepts of C which is important for statistical as well as mathematical investigation and problem solving. Student can gain knowledge of history and importance of C Programming language, basic structure programming, operators and expressions, decision making and branching, arrays, user defined functions, category of functions, recursion functions, storage class variables etc.

STAT-C-502 Statistical Computing Using C Programming
Marks: 100 [In-Sem : 20 + End Sem. : 80 (Theory : 50 Practical : 30] Credit 6

UNIT I

History and importance of C. Components, basic structure programming, character set, C tokens, Keywords and Identifiers and execution of a C program. Data types: Basic data types, enumerated data types, derived data types. Constants and variables: declaration and assignment of variables, Symbolic Constants, overflow and underflow of data. Operators and Expressions: Arithmetic, relational, logical, assignment, increment/decrement, operators, precedence of operators in arithmetic, relational and logical expression. Implicit and explicit type conversions in expressions, library functions. Managing input and output operations: reading and printing formatted and unformatted data   20 (9L+2T)

 UNIT II

Decision making and branching - if…else, nesting of if…else, else if ladder, switch, conditional operator. Looping in C for, nested for, while, do…while, jumps in and out of loops. Arrays: Declaration and initialization of one-dim and two-dim arrays. Character arrays and strings: Declaring and initializing string variables, reading and writing strings from Terminal (using scanf and printf only).   10 (5L+1T)

UNIT III

User- defined functions: A multi-function program using user-defined functions, definition of functions, return values and their types, function prototypes and calls. Category of Functions: no arguments and no return values, arguments but no return values, arguments with return values, no arguments but returns a value, functions that return multiple values. Recursion function. Passing arrays to functions, Storage class of Variables.   10 (5L+1T)

UNIT IV

 Pointers: Declaration and initialization of pointer variables, accessing the address of a variable, accessing a variable through its pointer, pointer expressions, pointer increments/decrement and scale factor. Pointers and arrays, arrays of pointers, pointers as function arguments, functions returning pointers.   10 (5L+1T)

PRACTICAL/ LAB WORK (Using C/C++ Programming Language) 30 (7L = 14 Class)

List of Practical

1. Plot of a graph y = f(x)

2. Roots of a quadratic equation (with imaginary roots also)

3. Sorting of an array and hence finding median

4. Mean, Median and Mode of a Grouped Frequency Data

5. Variance and coefficient of variation of a Grouped Frequency Data

6. Preparing a frequency table

7. Value of n! using recursion

8. Random number generation from uniform, exponential, normal (using CLT) and gamma distribution, calculate sample mean and variance and compare with population parameters.

9. Matrix addition, subtraction, multiplication Transpose and Trace

10. Fitting of Binomial, Poisson distribution and apply Chi-square test for goodness of fit

11. Chi-square contingency table

12. t-test for difference of means

13. Paired t-test

14. F-ratio test

15. Multiple and Partial correlation.

16. Compute ranks and then calculate rank correlation (without tied ranks)

17. Fitting of lines of regression

13.Core Course:C-13:STAT-C-601:Design of Experiments

After completion of the course of Design of Experiments student can able to collect data, analyze data, interpret and present the results. She/he has knowledge of how to plan, design and conduct experiments of CRD, RBD, LSD etc efficiently and effectively, and analyze the resulting data to obtain objective conclusions. Student can able to design an experiment and can do statistical analysis and interpreting the result by ANOVA. Student will gain a better understanding of the process of designing an experiment including Incomplete Block Design, factorial designs; examining how a factorial design allows cost reduction, increases efficiency of experimentation, and reveals the essential nature of a process.

STAT-C-601 Design of Experiments
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Experimental designs: Role, historical perspective, terminology, experimental error, basic principles, uniformity trials, fertility contour maps, choice of size and shape of plots and blocks. Basic designs: Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) – layout, model and statistical analysis, relative efficiency, analysis with single missing observation.   15 (7L+2T)

UNIT II

Incomplete Block Designs: Balanced Incomplete Block Design (BIBD) – parameters, relationships among its parameters, incidence matrix and its properties.   10 (4L+1T)

UNIT III

Factorial experiments: advantages, notations and concepts, 2^2, $2^3 \ldots 2^n$ and 3^2 factorial experiments, design and analysis, Total and Partial confounding for 2^n (n≤5) and 3^2.

15 (7L+2T)

UNIT IV

Factorial experiments in a single replicate. Fractional factorial experiments: Construction of one-half and one-quarter fractions of 2^n (n≤5) factorial experiments. 10 (4L+1T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

List of Practical

1. Analysis of a CRD

2. Analysis of an RBD

3. Analysis of an LSD

4. Analysis of an RBD with one missing observation

5. Analysis of an LSD with one missing observation

6. Intra Block analysis of a BIBD

7. Analysis of 2^2 and 2^3 factorial in CRD and RBD

8. Analysis of 2^2 and 2^3 factorial in LSD

9. Analysis of a completely confounded two level factorial design in 2 blocks

10. Analysis of a completely confounded two level factorial design in 4 blocks

11. Analysis of a partially confounded two level factorial design

12. Analysis of a single replicate of a 2^n design

13. Analysis of a fraction of 2^n factorial design

14.Core Course:C-14:STAT-C-602:
Multivariate Analysis and Nonparametric Methods

After completion of this course the students should be able to understand the concept of analysing multivariate data and various nonparametric methods. They will be familiar with a

basic minimum level of matrix competency and with general aspects of handling multivariate data. On successful completion of the course the student

- ➢ will able to distinguish between dependence and interdependence methods in multivariate data analysis
- ➢ can identify the most appropriate statistical techniques for a multivariate dataset
- ➢ can be carried out and apply commonly used multivariate data analysis techniques, and interpret results
- ➢ will appreciate the range of multivariate techniques available,
- ➢ will be able to summarize and interpret multivariate data,
- ➢ will have an understanding of the link between multivariate techniques and corresponding univariate techniques.
- ➢ will be able to use multivariate techniques appropriately, undertake multivariate hypothesis tests, and draw appropriate conclusions.
- ➢ will gain knowledge of various nonparametric tests.

STAT-C-602 Multivariate Analysis and Nonparametric Methods
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Bivariate Normal Distribution (BVN): p.d.f. of BVN, properties of BVN, marginal and conditional p.d.f. of BVN. Multivariate Data: Random Vector: Probability mass/density functions, Distribution function, Mean vector & Dispersion matrix, Marginal & Conditional distributions.

10 (5L+1T)

UNIT II

Multivariate Normal distribution and its properties. Sampling distribution for mean vector and variance-covariance matrix (sans deduction). Multiple and partial correlation coefficient and their properties.   15 (6L+2T)

UNIT III

Applications of Multivariate Analysis: Discriminant Analysis, Principal Components Analysis and Factor Analysis.   15 (5L+1T)

UNIT IV

Nonparametric Tests: Introduction and Concept, Test for randomness based on total number of runs, Empirical distribution function, Kolmogrov Smirnov test for one sample, Sign tests-one sample and two samples, Wilcoxon-Mann-Whitney test, Kruskal-Wallis test.

                                                                                                15 (6L+2T)

PRACTICALS/ LAB WORK: 30 (7L = 14 Class)

List of Practical

1. Multiple Correlation

2. Partial Correlation

3. Bivariate Normal Distribution,

4. Multivariate Normal Distribution

5. Discriminant Analysis

6. Principal Components Analysis

7. Factor Analysis

8. Test for randomness based on total number of runs,

9. Kolmogrov Smirnov test for one sample.

10. Sign test: one sample, two samples, large samples.

11. Wilcoxon-Mann-Whitney U-test 12. Kruskal-Wallis test

Discipline Specific Electives Papers in Statistics(taught at Gargaon College)

01.STAT-DSE-2: Time Series Analysis

This course is meant to acquaint the students with some important but useful concepts on topics in time series analysis so that the students can get an important background material for

taking up an advanced course in financial econometrics and data analysis. After completion of this course, the students will know about,

(a) time series data, its applications to various fields and components of time series,

(b) fitting and plotting of various growth curves such as modified exponential, Gompertz and logistic curve,

(c) fitting of trend by Moving Average method,

(d) measurement of Seasonal Indices by Ratio-to-Trend , Ratio-to-Moving Average and Link Relative methods,

(e) calculation of variance of random component by variate component method,

(f) applications to real data by means of laboratory assignments.

STAT-DSE-2: Time Series Analysis

Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Introduction to time series data, application of time series from various fields, Components of a times series, Decomposition of time series. Trend: Estimation of trend by free hand curve method, method of semi averages, fitting a various mathematical curve, and growth curves.

14 (6L+2T)

UNIT II

Method of moving averages. Detrending. Effect of elimination of trend on other components of the time series. Seasonal Component: Estimation of seasonal component by Method of simple averages, Ratio to Trend.   14 (6L+2T)

UNIT III

Seasonal Component continued: Ratio to Moving Averages and Link Relative method, Deseasonalisation. Cyclic Component: Harmonic Analysis. Some Special Processes: Movingaverage (MA) process and Autoregressive (AR) process of orders one and two.

14 (6L+2T)

UNIT IV

Random Component: Variate component method. Forecasting: Exponential smoothing methods of forecasting; Box-Jenkins's method; Stationary Time series: Weak stationarity, autocorrelation function and correlogram.   8 (2L+1T)

PRACTICAL / LAB WORK 30 (7L = 14 Class)

List of Practical

1. Fitting and plotting of modified exponential curve
2. Fitting and plotting of Gompertz curve
3. Fitting and plotting of logistic curve
4. Fitting of trend by Moving Average Method
5. Measurement of Seasonal indices Ratio-to-Trend method
6. Measurement of Seasonal indices Ratio-to-Moving Average method
7. Measurement of seasonal indices Link Relative method
8. Calculation of variance of random component by variate difference method
9. Forecasting by exponential smoothing

02. STAT-DSE-3: Econometrics

On successful completion of the course, students will be able to;

- ➢ Explain core concepts and techniques in econometrics, with a special focus on the classical linear regression model

- ➢ Understand the assumptions upon which different econometric methods are based and their implications.

- ➢ Comprehend the basic ideas of estimation and hypothesis testing

- ➢ Apply the learned techniques in analysing the economic theories

- ➢ Interpret and critically evaluate applied work and econometric findings

STAT-DSE-3: Econometrics

Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Introduction: Econometric models and its essences. General linear model (GLM) and its estimation. Simultaneous equation model: structural and reduced forms.   14 (6L+2T)

UNIT II

Multicollinearity: Introduction and concepts, detection of multicollinearity, consequences, detection and remedies of multicollinearity, specification errors.   14 (6L+2T)

UNIT III

Generalized least squares estimation, Aitken estimators. Autocorrelation: concept, consequences of autocorrelated disturbances, detection and remedies of autocorrelation.

14 (6L+2T)

UNIT IV

Heteroscedastic disturbances: Concepts and efficiency of Aitken estimator with OLS estimator under heteroscedasticity. Consequences of heteroscedasticity. Tests and solutions of heteroscedasticity. Autoregressive and Lag models.   8 (2L+1T)

PRACTICAL /LAB WORK 30 (7L = 14 Class)

List of Practical

1. Problems based on estimation of General linear model

2. Testing of parameters of General linear model

3. Forecasting of General linear model

4. Problems concerning specification errors

5. Problems related to consequences of Multicollinearity

6. Diagnostics of Multicollinearity

7. Problems related to consequences of Autocorrelation (AR(I))

8. Diagnostics of Autocorrelation

9. Estimation of problems of General linear model under Autocorrelation

10. Problems related to consequences Heteroscedasticity

11. Diagnostics of Heteroscedasticity

12. Estimation of problems of General linear model under Heteroscedastic distance terms

13. Problems related to General linear model under (Aitken Estimation)

14. Problems on Autoregressive and Lag models

03.STAT-DSE-4: Demography and Vital Statistics

After going through this course, the students will have an idea of

- ➢ commonly used measures of demography pertaining to its three basic aspects, viz. the fertility, mortality and migration,
- ➢ various data collection methods enabling them to have a better insight in policy making, planning and systematic implementation,
- ➢ Construction and implication of life tables,
- ➢ Population growth curves, population estimates and projections,
- ➢ Real data implementation of various demographic concepts as outlined above through practical assignments.

STAT-DSE-4 Demography and Vital Statistics
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Nature and scope of Demography. Population theories – Malthus, Natural and Biological, Demographic transition. Demographic data- sources, coverage and content errors. Use of balancing equations and Chandrasekharan-Deming formula to check completeness of registration data. Adjustment of age data- Myer and UN indices. Population composition, dependency ratio.

10 (4L+1T)

UNIT II

Sources of collecting data on Vital statistics, errors in census and registration data. Measurement of population: rate and ratio of vital events. Measurements of Mortality: Crude Death Rate (CDR), Specific Death Rates (SDR), Infant Mortality Rate (IMR) and Standardized Death Rates

.   15 (7L+2T)

UNIT III

Stationary and Stable population, Central Mortality Rates and Force of Mortality. Life (Mortality) Tables: Assumption, description, construction of Life Tables and Uses of Life Tables. Abridged Life Tables; Concept and construction of abridged life tables by ReedMerrell method, Greville's method and King's Method.

10 (4L+1T)

UNIT IV

Measurements of Fertility: Crude Birth Rate (CBR), General Fertility Rate (GFR), Specific Fertility Rate (SFR) and Total Fertility Rate (TFR). Measurement of Population Growth: Crude rates of natural increase, Pearl's Vital Index, Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR).

15 (7L+2T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

List of Practical

1. To calculate CDR and Age Specific death rate for a given set of data

2. To find Standardized death rate by:- (i) Direct method (ii) Indirect method

3. To construct a complete life table

4. To fill in the missing entries in a life table

5. To calculate probabilities of death at pivotal ages and use it construct abridged life table using

(i) Reed-Merrell Method, (ii) Greville's Method and (iii) King's Method

6. To calculate CBR, GFR, SFR, TFR for a given set of data

7. To calculate Crude rate of Natural Increase and Pearle's Vital Index for a given set of data

8. Calculate GRR and NRR for a given set of data and compare them.

04. STAT-DSE-8: Project Work

Students will opt for a compulsory Project in Semester VI. At the end of this project, students will be in a position to (a) analyze and interpret and take appropriate decisions in solving real life problems using statistical tools. (b) use different Statistical packages for graphical interface, data analysis and interpretation, (c) write and present a systematic Statistical Project Report.

Generic Elective Courses of Statistics taught at Gargaon College to students of other subjects

01. STAT-GE-01: Statistical Methods

Students are acquiring,

(a) knowledge of Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.

(b) information about various Statistical organisations in India and their functions for societal developments,

(c) knowledge of various types of data, their organisation and evaluation of summary measures such as measures of central tendency and dispersion etc.

(d) knowledge of other types of data reflecting quality characteristics including concepts of independence and association between two attributes,

(e) knowledge of various descriptive measures of statistics such as measures of central tendency, dispersion, moments etc.

(f) Knowledge of correlation, rank correlation, regression analysis, regression diagnostics, partial and multiple correlations.

STAT-GE-1 Statistical Methods

Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Introduction: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives.

10 (5L+1T)

UNIT II

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis. 16 (7L+2T)

UNIT III

Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves. 6 (7L+2T)

UNIT IV

Theory of attributes, consistency of data, independence and association of attributes, measures of association and contingency. 8 (3L+1T)

PRACTICAL/ LAB WORK 30 (7L = 14 Class)

List of Practical

1. Graphical representation of data

2. Problems based on measures of central tendency

3. Problems based on measures of dispersion

4. Problems based on combined mean and variance and coefficient of variation

5. Problems based on moments, skewness and kurtosis

6. Fitting of polynomials, exponential curves

7. Karl Pearson correlation coefficient 8. Partial and multiple correlations

9. Spearman rank correlation with and without ties.

10. Correlation coefficient for a bivariate frequency distribution

11. Lines of regression, angle between lines and estimated values of variables.

12. Checking consistency of data and finding association among attributes.

02. STAT-GE-2 Introductory Probability

Students will acquire-

(a) Ability to distinguish between random and non-random experiments,

(b) Knowledge to conceptualise the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem,

(c) Knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments, m.g.f., c.g.f., c.f. etc.

(d) Knowledge related to concept of convergence in probability, Chebychev's Inequality, WLLN, CLT etc.

(e) Knowledge of important discrete and continuous distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric, normal, uniform, exponential, beta and gamma distributions,

(f) Insight to apply standard discrete and continuous probability distributions to different situations.

STAT-GE-2 Introductory Probability

Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.   15 (6L+2T)

UNIT II

Random Variables: Discrete and continuous random variables, p.m.f., p.d.f., c.d.f. Illustrations of random variables and its properties. Expectation, variance, moments and moment generating function. 10 (5L+1T)

UNIT III Convergence in probability, almost sure convergence, Chebyshev's inequality, weak law of large numbers, De-Moivre Laplace and Lindeberg-Levy Central Limit Theorem (C.L.T.).

10 (5L+1T)

UNIT IV

Standard probability distributions: Binomial, Poisson, geometric, negative binomial, hypergeometric, uniform, normal, exponential, beta, gamma. 15 (6L+2T)

PRACTICAL/LAB. WORK: 30 (7L = 14 Class)

List of Practical

1. Fitting of binomial distributions for n and p = q = ½ given

2. Fitting of binomial distributions for n and p given

3. Fitting of binomial distributions computing mean and variance

4. Fitting of Poisson distributions for given value of lambda

5. Fitting of Poisson distributions after computing mean

6. Application problems based on binomial distribution

7. Application problems based on Poisson distribution

8. Problems based on area property of normal distribution

9. To find the ordinate for a given area for normal distribution

10. Application based problems using normal distribution

11. Fitting of normal distribution when parameters are given

12. Fitting of normal distribution when parameters are not given.

03. STAT-GE-3 Sample Survey

The students shall get,

(a) Basic knowledge of complete enumeration and sample, sampling frame, sampling distribution, sampling and non-sampling errors, principal steps in sample surveys, limitations of sampling etc.,

(b) Introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.

(c) An idea of conducting the sample surveys and selecting appropriate sampling techniques, (d) knowledge about comparing various sampling techniques.

STAT-GE-3 Sample Survey
Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Concept of population and sample, parameter and statistic, Census and sample survey (sampling unit and sampling frame. Needs for sampling). Steps in a sample survey. Probability and non-probability sampling. Sampling and non-sampling errors. Limitations of sampling.

<div align="right">12 (5L + 1T)</div>

UNIT II

Basic methods of sampling. SRS with and without replacement. Selection of random sample using lottery method & random numbers table. Estimation of population mean, total and proportion.   14 (6L + 2T)

UNIT III

Stratified random sampling – necessity, estimation of population mean, total and proportional and their variances. Allocation of samples into different strata using proportional method, Idea of Linear & Circular Systematic sampling, PPS sampling, Cluster sampling with equal size of clusters- illustration with examples.   14 (6L + 2T)

UNIT IV

Idea of two –stage, multi stage and multi phase sampling – their uses. Needs of determination of sample size, simple examples in SRS and stratified random sampling. Acquaintance with the

working of NSSO & NFHS: objective, questionnaire, sampling design, methods of field investigation. 10 (5L + 1T)

PRACTICAL/LAB WORK 30 (7L = 14 Class)

List of Practical

1. To select a SRS without replacement.

2. For a population of size 5, estimate population mean, population mean square and population variance. Enumerate all possible samples of size 2 by WOR and establish all properties relative to SRS.

3. For SRSWOR: estimation of mean, standard error, the sample size

4. Stratified Sampling: allocation of sample to strata by proportional method

5. Estimation of gain in precision in stratified sampling.

6. Preparation of questionnaire, sample size determination for mean, proportion with primary data (n < 100).

04. STAT-GE-4 Basics of Statistical Inference

After completing the course, the students will acquire-

(a) concept of random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions,

(b) knowledge about important inferential aspects of test of hypotheses and associated concepts,

(c) knowledge about inferences from large sample test, one sample and two sample problems

(d) knowledge about exact sampling distributions of Chi-square and chi square test of significance for categorical data, Yate's correction.

(f) Knowledge about significance test for correlation coefficients and some nonparametric tests.

(g). concept of one-way and two-way ANOVA, basic principles of design of experiments, CRD, RBD etc.

STAT-GE-4 Basics of Statistical Inference

Marks: 100 [In-Sem: 20 + End Sem.: 80 (Theory: 50 Practical: 30] Credit 6

UNIT I

Sampling distribution. Estimation of population mean, confidence intervals for the parameters of a normal distribution (one sample and two sample problems). The basic idea of significance test. Null and alternative hypotheses. Type I & Type II errors, level of significance, concept of p-value. Tests of hypotheses for the parameters of a normal distribution (one sample and two sample problems).   15 (7L+2T)

UNIT II

Categorical data: Tests of proportions, tests of association and goodness-of-fit using Chisquare test, Yates' correction. 10 (4L+1T) UNIT III Tests for the significance of correlation coefficient. Sign test for median, Sign test for symmetry, Wilcoxon two-sample test. 10 (4L+1T)

UNIT IV

Analysis of variance, one-way and two-way classification. Brief exposure of three basic principles of design of experiments, treatment, plot and block. Analysis of completely randomized design, randomized complete block design.   15 (7L+2T)

PRACTICAL/LAB WORK 30 (7L = 14 Class)

List of Practical

1. Estimators of population mean.

2. Confidence interval for the parameters of a normal distribution (one sample and two sample problems).

3. Tests of hypotheses for the parameters of a normal distribution (one sample and two sample problems).

4. Chi-square test of proportions.

5. Chi-square tests of association.

6. Chi-square test of goodness-of-fit.

7. Test for correlation coefficient.

8. Sign test for median.

9. Sign test for symmetry.

10. Wilcoxon two-sample test.

11. Analysis of Variance of a one-way classified data

12. Analysis of Variance of a two-way classified data.

13. Analysis of a CRD. 14. Analysis of an RBD.

Programme Outcome of B.Sc. Zoology

Zoology is broad subject encompassing classical and modern systemic aspects of animal diversity, as well as contemporary subjects like Molecular Biology, Bioinformatics, Biotechnology and Medical Diagnostics to foster comprehensive understanding about various aspects of animal science. The scope of Zoology as a subject is wide-ranging. The major areas of study within the discipline of Zoology are: Diversity of Non-chordates and Chordates; Comparative Anatomy of Vertebrates; Cell Biology; Biochemistry; Molecular Biology; Evolutionary Biology; Principles of Genetics; Principles of Ecology and Physiology. Diversity of Non-chordates and Chordates deals with the classification and adaptive diversity of animals from diverse phyla; Comparative Anatomy of Vertebrates deals with structural comparisons among all vertebrates; Cell Biology deals with the study of structure and functions of the cell; Biochemistry deals with the study of chemical substances and vital processes occurring within the living organisms; Molecular Biology deals with the nature of biological phenomena at the molecular level; Evolutionary Biology studies the evolutionary processes that produced the diversity of life on Earth, starting from a single common ancestor; Principles of Genetics deals with the molecular structure and function of genes, and gene behaviour in context of a cell or organism; Principles of Ecology studies the structure and function of nature; Physiology deals with the functions and activities of life or of living matter (such as organs, tissues, or cells) and of the physical and chemical phenomena involved. Degree program in Zoology deals with other topics that overlap with the areas outlined above (Immunology; Parasitology; Basics of Neurosciences; Animal

Behaviour and Chronobiology; Animal Biotechnology; Agrochemicals and Pest Management; Biology of Insecta; Endocrinology; Computational Biology; Fish and Fisheries; Reproductive Biology and Wildlife Conservation and Management); and that address the topics related to applied fields (such as Apiculture; Aquarium Fish Keeping; Medical Diagnostics; Research Methodology and Sericulture). The applied topics include visits to industries, fields or commercial culture units to get in-depth knowledge of the subject and also to explore employment opportunities in the field. In addition, some interdisciplinary topics are offered to students of other disciplines such as Animal Cell Biotechnology; Animal Diversity; Aquatic Biology; Environment and Public Health; Exploring the Brain: Structure and Function; Food, Nutrition and Health; Human Physiology and Insect Vectors and Diseases.

Graduate Aptitude in B.Sc. In Zoology:

Some of the characteristic attributes of a graduate in Zoology may include the following:

Disciplinary knowledge: Capable of demonstrating (i) comprehensive knowledge of major concepts, theoretical principles and experimental findings in Zoology and its different subfields including biodiversity, anatomy, physiology, biochemistry, biotechnology, ecology, evolutionary biology, cell biology, molecular biology, immunology and genetics, and some of the other applied areas of study such as wildlife conservation and management, apiculture, sericulture, neurosciences, aquatic biology, fish and fisheries sciences, bioinformatics and research methods; (ii) Interdisciplinary knowledge of allied biological sciences, environmental science and chemical science; (iii) learning of the various techniques, instruments, computational software used for analysis of animal's forms and functions.

Effective communicator: Capability to convey the intricate zoological information effectively and efficiently.

Critical thinker and problem solver: Ability to rationally analyze and solve the problems related to animal sciences without relying on assumptions and guess work.

Logical thinking and reasoning: Capability of seeking solutions and logically solving them by experimentation and data processing either manually or through software.

Team spirit: Ability to work effectively in a heterogeneous team.

Leadership quality: Ability to recognize and mobilize relevant resources essential for a project, and manage the project in a responsible way by following ethical scientific conduct and bio-safety protocols.

Digitally literate: Capable of using computers for biological simulation, computation and appropriate software for biostatistics, and employing search tools to locate, retrieve, and evaluate zoology-related data.

Ethical awareness: Avoiding unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, as well as appreciate environmental and sustainability issues.

Lifelong learners: Capable of self-paced and self-directed learning aimed at personal and social development.

Programme Specific Learning Outcome:

Students enrolled in B.Sc. (Hons.) degree program in Zoology will study and acquire complete knowledge of disciplinary as well as allied biological sciences. At the end of graduation, they should possess expertise which will provide them competitive advantage in pursuing higher studies from India or abroad; and seek jobs in academia, research or industries.

Students should be able to identify, classify and differentiate diverse chordates and non-chordates based on their morphological, anatomical and systemic organization. They will also be able to describe economic, ecological and medical significance of various animals in human life. This will create a curiosity and awareness among them to explore the animal diversity and take up wild life photography or wild life exploration as a career option. The procedural knowledge about identifying and classifying animals will provide students professional advantages in teaching,

research and taxonomist jobs in various government organizations; including Zoological Survey of India and National Parks/Sanctuaries.

Acquired practical skills in biotechnology, biostatistics, bioinformatics and molecular biology can be used to pursue career as a scientist in drug development industry in India or abroad. Our students will be acquiring basic experimental skills in various techniques in the fields of genetics; molecular biology; biotechnology; qualitative and quantitative microscopy; enzymology and analytical biochemistry. These methodologies will provide an extra edge to our students, who wish to undertake higher studies. In-depth knowledge and understanding about comparative anatomy and developmental biology of various biological systems; and learning about the organization, functions, strength and weaknesses of various systems will let students critically analyses the way evolution has shaped these traits in the human body.

Students undertaking skill enhancement courses like aquaculture, sericulture and apiculture will inculcate skills involved in rearing fish, bees and silk moth which would help them in starting their own ventures and generating self-employment making them successful entrepreneurs. Acquired skills in diagnostic testing, haematology, histopathology, staining procedures etc. used in clinical and research laboratories will provide them opportunity to working diagnostic or research laboratory. Deep understanding of different physiological systems and methods available to measure vital physiological parameters and to comprehend the mechanism behind occurrence of different life-threatening disease *via* laboratory examination, assessment of basic physiological functions by interpreting physiological charts will help to find their career options.

Students undertaking wild life management courses would gain expertise in identifying key factors of wild life management and be aware about different techniques of estimating, remote sensing and Global positioning of wild life. This course will motivate students to pursue as career in the field of wildlife conservation and management.

CORE COURSE I
NON-CHORDATES I: PROTISTS TO PSEUDOCOELOMATES

Course Learning Objective:

The course would provide an insight to the learner about the existence of different life forms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organization of the animals based on their evolutionary relationships, structural and functional affinities. The course will also make the students aware about the characteristic morphological and anatomical features of diverse animals; economic, ecological and medical significance of various animals in human life; and

will create interest among them to explore the animal diversity in nature.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- ❖ Learn about the importance of systematics, taxonomy and structural organization of animals.
- ❖ Appreciate the diversity of non-chordates living in varied habit and habitats.
- ❖ Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- ❖ Critically analyse the organization, complexity and characteristic features of non-chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla.
- ❖ Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- ❖ Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

Course Content: THEORY
(Credits 4)

Unit 1: Protista, Parazoa and Metazoa

19

General characteristics and Classification up to Classes; Structural organization & nutrition of Euglena, Amoeba and Paramecium; Life cycle and pathogenicity of Plasmodium vivax; Locomotion and Reproduction in Animal protista (Protozoa); Evolution of symmetry and segmentation of Metazoa

Unit 2: Porifera
7

General characteristics and Classification up to classes; Canal system and spicules in sponges

Unit 3: Cnidaria

12

General characteristics and Classification up to classes; Metagenesis in Obelia; Polymorphism in Cnidaria; Corals and coral reefs

Unit 4: Ctenophora

4

General characteristics and Evolutionary significance

Unit 5: Platyhelminthes

10

General characteristics and Classification up to classes; Life cycle and pathogenicity of *Fasciola hepatica* and *Taenia solium*

Unit 6: Nemathelminthes

8

General characteristics and Classification up to classes; Life cycle, and pathogenicity of *Ascaris lumbricoides* and *Wuchereria bancrofti*; Parasitic adaptations in helminthes

NON-CHORDATES I: PROTISTS TO PSEUDOCOELOMATES PRACTICALS (Credits 2)

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramecium,* Binary fission and Conjugation in *Paramecium*

2. Examination of pond water collected from different places for diversity in Animal protista (Protozoa)

3. Study of *Sycon* (T.S. and L.S.), *Hyalonema, Euplectella, Spongilla*

4. Identification of museum specimen: *Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora* and One specimen/slide of any ctenophore

5. Study of adult *Fasciola hepatica*, *Taenia solium* and their life cycles (Slides/micro-photographs)
6. Study of adult *Ascaris lumbricoides* and its life stages (Slides/micro-photographs)

7. To submit a Project Report on any related topic based on theory syllabus.

CORE COURSE II
PRINCIPLES OF ECOLOGY

Course Learning Objective:

The primary aim of the syllabus is to sensitize the students about the paramount role and importance of nature. The study of Ecology imparts us the knowledge about the judicious use of existing ecological resources for sustainable development. Ecology is the only branch of science which briefs us on the ways and means of living with nature for mutual benefit. Study of ecology will provide students opportunity to understand its practical aspects and helps them to solve many contemporary ecological issues such as global warming, land degradation, habitat loss, desertification and pollution etc. The hands-on experiences of laboratory will also enable students to understand the ecosystem and ecology in a better way.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- ❖ Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors.
- ❖ Comprehend the population characteristics, dynamics, growth models and interactions.
- ❖ Understand the community characteristics, ecosystem development and climax theories.
- ❖ Know about the types of ecosystems, food chains, food webs, energy models, and ecological efficiencies.
- ❖ ·Apply the basic principles of ecology in wildlife conservation and management.
- ❖ Inculcate scientific quantitative skills, evaluate experimental design, read graphs, and analyses and use information available in scientific literature.

Course Content: THEORY
(Credits 4)

Unit 1: Introduction to Ecology

6

History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of abiotic factors

Unit 2: Population

24

Unitary and Modular populations

Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors of Population interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition and Predation, functional and numerical responses

Unit 3: Community

12

Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological succession with hydrosere Theories pertaining to climax community

Unit 4: Ecosystem

14

Types of ecosystems with one example in detail (Forest ecosystem), Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies; Nutrient and biogeochemical cycle with Nitrogen cycle as an example; Human modified ecosystem

Unit 5: Applied Ecology

4

Concept of wildlife conservation (Usefulness, causes and consequences of degradation); Management strategies

PRINCIPLES OF ECOLOGY
PRACTICALS (Credits 2)

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided

2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community

3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method) and free CO_2

4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary/Reserve Fore

CORE COURSE III
NON-CHORDATES II: COELOMATES

Course Learning Objective:

The course would provide an insight to the learner about the existence of different life forms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organisation of the animals based on their evolutionary relationships, structural and functional affinities. The course will also make the students aware about the characteristic morphological and anatomical features of diverse animals; economic, ecological and medical significance of various animals in human life; and will create interest among them to explore the animal diversity in nature.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- ❖ Learn about the importance of systematics, taxonomy and structural organization of animals.
- ❖ Appreciate the diversity of non-chordates living in diverse habit and habitats.
- ❖ Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- ❖ Critically think about the organization, complexity and characteristic features of non-chordates.
- ❖ Getting familiarized with the morphology and anatomy of representatives of various animalphyla.
- ❖ Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- ❖ Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments and projects.

Course Content: THEORY
(Credits 4)

Unit 1: Introduction to Coelomates

2

Evolution of coelom and metamerism

Unit 2: Annelida

10

General characteristics and Classification up to classes; Excretion in Annelida

Unit 3: Arthropoda

17

General characteristics and Classification up to classes; Vision and Respiration in Arthropoda
Metamorphosis in Insects; Social life in bees and termites

Unit 4: Onychophora

4

General characteristics and Evolutionary significance

Unit 5: Mollusca

10

General characteristics and Classification up to classes; Respiration in Mollusca; Torsion and detorsion in Gastropoda; Pearl formation in bivalves; Evolutionary significance of trochophore larva

Unit 6: Echinodermata

12

General characteristics and Classification up to classes; Water-vascular system in Asteroidea Larval forms in Echinodermata; Affinities with Chordate.

NON-CHORDATES II: COELOMATES
PRACTICAL
(Credits 2)

1. Study of following specimens:

Annelids - *Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria*

Arthropods - *Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta*, termites and honey bees Onychophora - *Peripatus*

Molluscs - *Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus*

Echinodermates - *Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon*

2. Study of digestive system, septal nephridia and pharyngeal nephridia of earthworm

3. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm

4. Mount of mouth parts and dissection of digestive system and nervous system of

Periplaneta*

5. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)

CORE COURSE IV
CELL BIOLOGY

Course Learning Objective:

The objective of the course is to help the students to learn and develop an understanding of a

cell as a basic unit of life. This course is designed to enable them to understand the functions of cellular organelles and how a cell carries out and regulates cellular functions.

Course Learning Outcome:

Upon completion of the course, students should to be able to:

- ❖ Understand fundamental principles of cell biology.
- ❖ Explain structure and functions of cell organelles involved in diverse cellular processes.
- ❖ Appreciate how cells grow, divide, survive, die and regulate these important processes.
- ❖ Comprehend the process of cell signalling and its role in cellular functions.
- ❖ Have an insight of how defects in functioning of cell organelles and regulation of cellular processes can develop into diseases.
- ❖ Learn the advances made in the field of cell biology and their applications.

Course Content: THEORY
(Credits 4)

Unit 1: Overview of Cells

3

Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma, Prions

Unit 2: Plasma Membrane

7

Various models of plasma membrane structure Transport across membranes: Active and Passive transport, Facilitated transport; Cell junctions: Tight junctions, Desmosomes, Gap junctions

Unit 3: Endomembrane System

10

Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes

Unit 4: Mitochondria and Peroxisomes

8

Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis; Peroxisomes

Unit 5: Cytoskeleton

8

Structure and Functions: Microtubules, Microfilaments and Intermediate filaments

Unit 6: Nucleus

12

Structure of Nucleus: Nuclear envelope, nuclear pore complex, Nucleolus; Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome)

Unit 7: Cell Division

8

Mitosis, Meiosis, Cell cycle and its regulation

Unit 8: Cell Signalling

4

GPCR and Role of second messenger (cAMP)

CELL BIOLOGY
PRACTICAL
(Credits 2)

1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis

2. Study of various stages of meiosis.

3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.

4. Preparation of permanent slide to demonstrate:

i DNA by Feulgen reaction

ii DNA and RNA by MGP

iii Mucopolysaccharides by PAS reaction

iv Proteins by Mercurobromophenol blue/Fast Green

CORE COURSE V
DIVERSITY OF CHORDATA

Course Learning Objective:

The course is designed with an aim to provide scope and historical background of chordates. It will impart knowledge regarding basic concepts of origin of chordates and make the students understand the characteristics and classification of animals with notochord. The exclusive phenomena in chordates like biting mechanism in snakes, flight adaptations in birds etc. will be explained. The adequate explanation to the students regarding various mechanisms involved in thriving survival of the animals within their geographic realms will create interest among students.

Course Learning Outcome:

Upon completion of the course, the students will be able to:

- ❖ Understand different classes of chordates, level of organization and evolutionary relationship between different subphyla and classes, within and outside the phylum.
- ❖ Study about diversity in animals making students understand about their distinguishing features.
- ❖ Appreciate similarities and differences in life functions among various groups of animals in Phylum Chordata.
- ❖ Comprehend the circulatory, nervous and skeletal system of chordates.
- ❖ Know about the habit and habitat of chordates in marine, freshwater and terrestrial ecosystems.

Course Content: THEORY

(Credits 4)

Unit 1: Introduction to Chordates 2

General characteristics and outline classification

Unit2: Protochordata **8**

General characteristics of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata

Unit 3: Origin of Chordata **3**

Dipleurula concept and the Echinoderm theory of origin of chordatesAdvanced features of vertebrates over Protochordata

Unit 4: Agnatha **2**

General characteristics and classification of cyclostomes up to class

Unit 5: Pisces **8**

General characteristics of Chondrichthyes and Osteichthyes, classification up toorder Migration, Osmoregulation and Parental care in fishes

Unit 6: Amphibia **6**

Origin of Tetrapoda (Evolution of terrestrial ectotherms); Generalcharacteristics and classification up to order; Parental care in Amphibians

Unit 7: Reptilia **7**

General characteristics and classification up to order; Affinities ofSphenodon; Poison apparatus and Biting mechanism in snakes

Unit 8: Aves **8**

General characteristics and classification up to order Archaeopteryx—a connecting link; Principles and aerodynamics of flight, Flight adaptations and Migration in birds

Unit 9: Mammals **8**

General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages

Unit 10: Zoogeography 8

Zoogeographical realms, Theories pertaining to distribution of animals, Platetectonic and Continental drift theory, distribution of vertebrates in different realms

DIVERSITY OF CHORDATA
PRACTICAL
(Credits 2)

1. Identification:

(i) Protochordata: *Balanoglossus, Herdmania, Branchiostoma*, Colonial Urochordata Sections of *Balanoglossus* through proboscis and branchiogenital regions, Sections of Amphioxus through pharyngeal, intestinal and caudal regions. Permanent slide of Herdmania spicules

(ii) Agnatha: *Petromyzon, Myxine*

(iii) Fishes: *Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas*, Flat fish

(iv) Amphibia: *Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra*

(v) Reptilia: *Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus*; Key for Identification of poisonous and non-poisonous snakes

(vi) Aves: Study of six common birds from different orders. Types of beaks and claws

(vii) Mammalia: *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus, Loris, Herpestes, Erinaceous.*

2. Dissection of weberian ossicles of *Mystus*, pecten from Fowl head

3. Dissection of Fowl head (Dissections and mounts subject to permission)

Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)

4. To study and prepare a chart of keys of identification of poisonous and non-poisonous snakes.

CORE COURSE VI
ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS

Course Learning Objective:

Physiology is the study of life, specifically, how cells, tissues and organ function. It is a core

and fundamental scientific discipline that underpins the health and well-being of living organisms. Besides satisfying a natural curiosity about how our body systems function, itgives us knowledge about the functions of all the parts and systems of the body. It is also of central importance in medicine and related health sciences. The course has been designed to extend the fundamental or coherent understanding of the subject to related disciplinary areas/subjects through understanding of normal body functions, assisting in more effective treatment of abnormal or diseased states. It will equip the students with skill-based knowledge, enabling them to undertake further studies in physiology and related areas as well as in multidisciplinary subjects.

Course Learning Outcome:

Upon completion of the course, students will be able to:

- ❖ Know the basic fundamentals and understand advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.
- ❖ Comprehend and analyze problem-based questions
- ❖ Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body and use of feedback loops to control the same
- ❖ Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body. Synthesize ideas to make connection between knowledge of physiology and real-world situations, including healthy life style decisions and homeostatic imbalances
- ❖ Know the role of regulatory systems *viz.* endocrine and nervous systems and their amalgamation in maintaining various physiological processes.

Course Content: THEORY
(Credits 4)

Unit 1: Tissues **6**

Structure, location, classification and functions of epithelial tissue; connective tissue, muscular tissue and nervous tissue

Unit 2: Bone and Cartilage   **4**

Structure and types of bones and cartilages, Ossification, bone growth and resorption

Unit 3: Nervous System   **10**

Structure of neuron, resting membrane potential, Origin of action potentialand its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc; Physiology of hearing and vision.

Unit 4: Muscle   **12**

Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus

Unit 5: Reproductive System   **10**

Histology of testis and ovary; Physiology of male and female reproduction;Puberty, Methods of contraception in male and female

Unit 6: Endocrine System   **18**

Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted by them and their mechanism of action; Classification of hormones; Regulation of their secretion; Mode of hormone action, Signal transduction pathways for steroidal and non-steroidal hormones; Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system; Placental hormones

ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS
PRACTICALS (Credits 2)

1. Recording of simple muscle twitch with electrical stimulation (or Virtual)

2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)

3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells

4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid

5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues

CORE COURSE VII
FUNDAMENTALS OF BIOCHEMISTRY

Course Learning Objective:

Biochemistry is to understand the core biological phenomena at the molecular level. The aim of the course is to comprehend the fundamental principles of chemistry that govern complexbiological systems.The program is designed to enable a student acquire sound knowledge ofbiochemistry and its practicable applicability. To make the study relevant, interesting,encouraging to the students to join the industry or to prepare them for higher studies includingresearch. The new and updated syllabus is based on a basic and applied approach to ensurethat students develop problem solving skills, laboratory skills, chemistry communicationskills, team skills as well as ethics.

Course Learning Outcome:

- ❖ Upon completion of the course, students should be able to: Gain knowledge and skill inthe fundamentals of biochemical sciences, interactions and interdependence ofphysiological and biochemical processes.
- ❖ Get exposed to various processes used in industries and gain skills in techniques ofchromatography and spectroscopy.
- ❖ Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleicacids, and carbohydrates; and their role in metabolic pathways along with their regulation.
- ❖ Know about classical laboratory techniques, use modern instrumentation, design andconduct scientific experiments, and analyze the resulting data.

❖ Be knowledgeable in proper procedures and regulations in handling and disposal ofchemicals.

Course Content: THEORY
(CREDITS 4)

Unit 1: Carbohydrates   8

Structure and Biological importance: Monosaccharides, Disaccharides; Polysaccharides and Glycoconjugates

Unit 2: Lipids   8

Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids

Unit 3: Proteins   14

Amino acids: Structure, Classification and General properties of α-aminoacids; Physiological importance of essential and non-essential α-amino acids Proteins: Bonds stabilizing protein structure; Levels of organization in proteins; Denaturation; Introduction to simple and conjugate proteins Immunoglobulins: Basic Structure, Classes and Function, Antigenic
Determinants

Unit 4: Nucleic Acids   12

Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Cot Curves: Base pairing, Denaturation and Renaturation of DNA Types of DNA and RNA, Complementarity of DNA, Hpyo-Hyperchromaticity of DNA

Unit 5: Enzymes   18

Nomenclature and classification; Cofactors; Specificity of enzymeaction; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of K_m and V_{max}, Lineweaver-Burk plot; Multi-substrate reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Regulation of enzyme action

FUNDAMENTALS OF BIOCHEMISTRY
PRACTICAL (CREDITS 2)

1. Qualitative tests of functional groups in carbohydrates, proteins and lipids.

2. Paper chromatography of amino acids.

3. Action of salivary amylase under optimum conditions.

4. Effect of pH, temperature and inhibitors on the action of salivary amylase.

5. Demonstration of proteins separation by SDS-PAGE (theoretically).

CORE COURSEVIII
COMPARATIVE ANATOMY OF VERTEBRATES

Course Learning Objective:

This course aims to provide the undergraduate students a thorough knowledge of structural details and comparative account of the different organ systems of the body from lower to higher vertebrates, and protochordates, thus enabling them to appreciate the incredible vertebrate diversity. The course furnishes an understanding of evolutionary basis of morphological and anatomical differences as well as similarities that occur among vertebrates. It helps students propose possible homology between structures, and understand how they evolved as the vertebrates dwelled different habitats. The structural modifications of digestive, circulatory, respiratory and skeletal system relates to the distribution of animals in their different comfort zones of habitat and ecological niches. The understanding of anatomical details of organ systems of mammals like rat and mice aims to gives the basic information for their use in experimental and research studies in different branches of Zoology like Immunology, Medical Zoology and Reproductive Biology etc.

Course Learning Outcome:

Upon completion of the course, students should be able to:
   ❖ Explain comparative account of the different vertebrate systems

- ❖ Understand the pattern of vertebrate evolution, organisation and functions of various systems.
- ❖ Learn the comparative account of integument, skeletal components, and their functions and modifications in different vertebrates.
- ❖ Understand the evolution of heart, modification in aortic arches, and structure of respiratory organs used in aquatic, terrestrial and aerial vertebrates; and digestive system and its anatomical specializations with respect to different diets and feeding habits.
- ❖ Learn the evolution of brain, sense organs and excretory organs to a complex, highly evolved form in mammals;
- ❖ Learn to analyze and critically evaluate the structure and functions of vertebrate systems, which helps them to discern the developmental, functional and evolutionary history of vertebrate species.
- ❖ Understand the importance of comparative vertebrate anatomy to discriminate human biology.

Course Content: THEORY
(CREDITS 4)

Unit 1: Integumentary System

8

Structure, functions and derivatives of integument

Unit 2: Skeletal System

8

Overview of axial and appendicular skeleton, Jaw suspensorium, Visceralarches

Unit 3: Digestive System

8

Alimentary canal and associated glands, dentition

Unit 4: Respiratory System

8

Skin, gills, lungs and air sacs; Accessory respiratory organs

Unit 5: Circulatory System

8

General plan of circulation, evolution of heart and aortic arches

Unit 6: Urinogenital System

6

Succession of kidney, Evolution of urinogenital ducts, Types of mammalianuteri

Unit 7: Nervous System

8

Comparative account of brain; Autonomic nervous system, Spinal cord, Cranial nerves in mammals

Unit 8: Sense Organs

6

Classification of receptors; Brief account of visual and auditory receptors in man

<div align="center">

COMPARATIVE ANATOMY OFVERTEBRATES
PRACTICAL (CREDITS 2)

</div>

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs

2. Disarticulated skeleton of Frog, *Varanus,* Fowl, Rabbit

3. Mammalian skulls: One herbivorous and one carnivorous animal

4. Dissection of fish (carp) to study efferent and afferent branchial system(subject to permission)

5. Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording (may be included if dissection not permitted)

<div align="center">

CORE COURSE IX
ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

</div>

Course Learning Objective:

Physiology is the study of life, specifically, how cells, tissues and organ function. It is a core and fundamental scientific discipline that defines the health and well-being of living organisms. Besides satisfying a natural curiosity about how our body systems function, it gives us knowledge about the functions of all the parts and systems of the body. It is also of central importance in

medicine and health sciences. The course has been designed to applyt he theoretical concept to the laboratory exercises for acquiring skills. The fundamental or coherent understanding of the subject will be extended to related disciplinary areas/subjects through understanding of normal body functions, enabling effective treatment of abnormal or diseased states. The students will be equipped with skill-based knowledge to help them undertake further studies in physiology and related areas as well as in multidisciplinary subjects.

Course Learning Outcome:

Upon completion of the course, students should be able to:
- ❖ Have a clear knowledge of basic fundamentals and understanding of advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.
- ❖ Comprehend and analyse problem-based questions on physiological aspects.
- ❖ Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body; and use of feedback loops to control the same.
- ❖ Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.

Course Content: THEORY
(Credits 4)

Unit 1: Physiology of Digestion   **14**
Structural organization and functions of gastrointestinal tract and associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Hormonal control of secretion of enzymes in Gastrointestinal tract.

Unit 2: Physiology of Respiration   **12**
Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; Respiratory pigments, Dissociation curves and the factors influencing it; Carbon monoxide poisoning; Control of respiration

Unit 3: Renal Physiology   **8**

Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance

Unit 4: Blood   **14**
Components of blood and their functions; Structure and functions of haemoglobin; Haemostasis: Blood clotting system, Kallikrein-Kinninogensystem, Complement system & Fibrinolytic system, Haemopoiesis Blood groups: Rh factor, ABO and MN

Unit 5: Physiology of Heart   **12**
Structure of mammalian heart; Coronary circulation; Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses Cardiac cycle; Cardiac output and its regulation, Frank-Starling Law of the heart, nervous and chemical regulation of heart rate. Electrocardiogram, Blood pressure and its regulation

<div align="center">

**ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS
PRACTICALS (CREDITS 2)**

</div>

1. Determination of ABO Blood group and Rh factor

2. Enumeration of red blood cells and white blood cells using haemocytometer

3. Estimation of haemoglobin using Sahli's haemoglobinometer

4. Preparation of haemin and haemochromogen crystals

5. Recording of frog's heart beat under *in situ* and perfused conditions*

6. Recording of blood pressure using a sphygmomanometer

7. Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney

<div align="center">

CORE COURSE X
BIOCHEMISTRY OF METABOLIC PROCESSES

</div>

Course Learning Objective:

The program is designed to enable a student acquire sound knowledge of biochemistry and its practicable applicability. Effort has been made to make the study relevant, interesting and encouraging to the students to join the industry or to prepare them for higher studies including research. The new and updated syllabus is based on a basic and applied approach to ensure that students develop problem solving skills, laboratory skills, chemistry communication skills, team skills as well as ethics.

Course Learning Outcome:

Upon completion of the course, students will be able to

- ❖ Gain knowledge and skill in the interactions and interdependence of physiological and biomolecules
- ❖ Understand essentials of the metabolic pathways along with their regulation.
- ❖ Know the principles, instrumentation and applications of bio-analytical techniques.
- ❖ Get exposure to various processes used in industries.
- ❖ Become aware about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments and analyze the resulting data.
- ❖ Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals

Course Content: THEORY
(CREDITS 4)

Unit 1: Overview of Metabolism   **10**

Catabolism vs. Anabolism, Stages of catabolism, Compartmentalization of metabolic pathways, Shuttle systems and membrane transporters; ATP as "Energy Currency of cell"; coupled reactions; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanisms

Unit 2: Carbohydrate Metabolism   **16**

Sequence of reactions and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis

Unit 3: Lipid Metabolism   **14**

β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis

Unit 4: Protein Metabolism   **10**
Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fateof C-skeleton of Glucogenic and Ketogenic amino acids

Unit 5: Oxidative Phosphorylation   **10**
Redox systems; Review of mitochondrial respiratory chain, Inhibitors andun-couplers of Electron Transport System

BIOCHEMISTRY OF METABOLIC PROCESS
PRACTICALS (CREDITS 2)

1. Estimation of total protein in given solutions by Lowry's method.

2. Detection of SGOT and SGPT or GST and GSH in serum/ tissue

3. To study the enzymatic activity of Trypsin and Lipase.

4. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.

5. Dry Lab: To trace the labelled C atoms of Acetyl-CoA till they evolve as CO2 in the TCA cycle

CORE COURSE XI
MOLECULAR BIOLOGY

Course Learning Objective:

The course aims to provide students with an introduction of the underlying molecular mechanisms of various biological processes in cells and organisms. The study primarily involves learning about structure and synthesis of deoxyribo- and ribo-nucleic acids, formation of proteins, and regulation of gene expression. The course aims to develop basic understanding of structure-function relationships of nucleic acids and proteins.

Course Learning Outcome:

Upon completion of the course, students will be able to:

- ❖ Describe the basic structure and chemistry of nucleic acids, DNA and RNA;
- ❖ Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.
- ❖ Elucidate the molecular machinery and mechanism of information transfer processes– transcription and translation-in prokaryotes and eukaryotes;
- ❖ Explain post-transcriptional modification mechanisms for the processing of eukaryotic RNAs;
- ❖ Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose and tryptophan metabolism operons;
- ❖ Give an overview of gene expression regulation in eukaryotes;
- ❖ Explain the significance of DNA repair mechanisms in controlling DNA damage;
- ❖ Recognize role of RNAs (ribo-switches, siRNA and miRNA) in gene expression regulation.
- ❖ Demonstrate practical knowledge of raising, handling, maintenance and special features such as antibiotic resistance of a simple prokaryotic model organism, *Escherichia coli*.
- ❖ Quantitatively estimate concentration of DNA and RNA by colorimetric methods.

Course Content: THEORY
(CREDITS 4)

Unit 1: Nucleic Acids   **4**
Salient features of DNA and RNA; Watson and Crick model of DNA

Unit 2: DNA Replication   **12**
DNA Replication in prokaryotes and eukaryotes, mechanism of DNA replication, Semi-conservative, bidirectional and semi-discontinuous replication, RNA priming, Replication of circular and linear ds-DNA,

Unit 3: Transcription   **10**

RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors

Unit 4: Translation 10
Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation

Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA 6
Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA

Unit 6: Gene Regulation 10
Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencer elements; Gene silencing, Genetic imprinting

Unit 7: DNA Repair Mechanisms 3
Pyrimidine dimerization and mismatch repair

Unit 8: Regulatory RNAs 3
Concept of Ribo-switches, RNA interference, miRNA, siRNA

MOLECULAR BIOLOGY
PRACTICAL (CREDITS 2)

1. Study of Polytene chromosomes from Chironomous / Drosophila larvae

2. Preparation of liquid culture medium (LB) and innoculation

3. Preparation of solid culture medium (LB) and growth of *E. coli* by spreading and streaking

4. Quantitative estimation of salmon sperm/calf thymus DNA using colorimeter (Diphenylamine reagent)
5. Quantitative estimation of RNA using Orcinol reaction

6. Study and interpretation of electron micrographs/ photograph showing

(a) DNA replication

(b) Transcription

(c) Split genes

CORE COURSE XII
PRINCIPLES OF GENETICS

Course Learning Objective:

Unknown to them, human beings had been applying the principles of genetics by engaging in selective breeding of domesticated animals for many centuries. However, it was only with the work of Mendel and advent of 20th century, that basic principles of the science of genetics were formulated. In about a century of its existence, this field has generated tremendous amount of knowledge through observational and experimental research. The information amassed in the last century has laid the foundation for more discoveries in this important field of life science. This course aims to provide an overview of genetics starting from the work of Mendel to the current understanding of various phenomena like recombination, transposition, sex determination and mutations. The course will help in building sound fundamental knowledge of the principles of genetics, to be used as a stepping stone for higher studies and research in this field.

Course Learning Outcome:

Upon completion of the course, students will be able to:

- ❖ Have a deeper understanding of the varied branches of the biological sciences like microbiology, evolutionary biology, genomics and metagenomics.
- ❖ Gain knowledge of the basic principles of inheritance.
- ❖ Analyse pedigree leading to development of analytical skills and critical thinking enabling the students to present the conclusion of their findings in a scientific manner.
- ❖ Know the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day-to-day life.

❖ Find out the effects of indiscriminate use of various chemicals, drugs or insecticides in nature by studying their effect on various bacterial species in soil and water samples from different industrial or polluted areas.

Course Content: THEORY
(CREDITS 4)

Unit 1: Mendelian Genetics and its Extension   **8**
Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex-influenced and sex-limited characters inheritance.

Unit 2: Linkage, Crossing Over and Chromosomal Mapping   **12**
Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including models of recombination, Recombination frequency as a measure of linkage intensity, Two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.

Unit 3: Mutations   **10**
Types of gene mutations (Classification), Types of chromosomal aberrations Classification, figures and with one suitable example of each), Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB method, attached X method.

Unit 4: Sex Determination   **4**
Chromosomal mechanisms of sex determination in Drosophila and Man

Unit 5: Extra-chromosomal Inheritance   **6**
Criteria for extra-chromosomal inheritance, Antibiotic resistance in Chlamydomonas, Mitochondrial mutations in Saccharomyces, Infective heredity in Paramecium and Maternal effects

Unit 6: Polygenic Inheritance   **3**
Polygenic inheritance with suitable examples; simple numericals based on it.

Unit 7: Recombination in Bacteria and Viruses   **9**
Conjugation, Transformation, Transduction, Complementation test inBacteriophage

Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, Transposons in humans

PRINCIPLES OF GENETICS
PRACTICALS (CREDITS 2)

1. To study the Mendelian laws and gene interactions (based on theory)

2. Chi-square analyses using seeds/beads/*Drosophila*.

3. Linkage maps based on data from conjugation, transformation and transduction.

4. Linkage maps based on data from *Drosophila* crosses.

5. Study of human karyotype (normal and abnormal) based on data.

6. Pedigree analysis of some human inherited traits.

CORE COURSE XIII
DEVELOPMENTAL BIOLOGY

Course Learning Objective:

The main aim of the paper on Developmental Biology is to provide the undergraduate students an in-depth knowledge on the embryonic and post embryonic developmental processes. An important aspect of developmental biology is its implication in medicine which is also dealt with in this course. The approach of this paper is to make the students realize the most fascinating aspect of developmental biology that a single fertilized egg can give rise to a fully developed complex organism. The course explains the basic principles and concepts underlying the developmental processes at the cellular and molecular level. To understand morphogenesis, the students are introduced to model organisms like Sea urchin, *Drosophila,* Frog and Chick to study different types of eggs, cleavage patterns and various morphogenetic movements during gastrulation leading to formation of germ layers and their fate. By understanding the developmental processes, the students can relate to errors occurring during development leading to congenital disorders and human diseases. The paper also addresses the problems of infertility in humans. The students are familiarized with the technique of IVF and pre-diagnostic methods to

identify any abnormality arising during development. The students are made aware of the areas of great interest including stem cell therapy, tissue engineering and regenerative medicine.

Course Learning Outcome:

Upon completion of the course, students should be able to:
- ❖ Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote.
- ❖ Acquire basic knowledge of the cellular processes of development and the molecular mechanisms underlying these.
- ❖ Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organisms.
- ❖ Discuss the general mechanisms involved in morphogenesis and to explain how different cells and tissues interact in a coordinated way to form various tissues and organs.
- ❖ Understand about the evolutionary development of various animals.
- ❖ Know the process of ageing leading to interventions that can improve the overall health and quality of life in aged people.
- ❖ Learn the importance of latest techniques like stem cell therapy, *in vitro* fertilization and amniocentesis etc. to be applied for human welfare.
- ❖ Develop the skill to raise and maintain culture of model system; *Drosophila* in the laboratory.

Course Content: THEORY
(CREDITS 2)

Unit 1: Introduction   4
Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division

Unit 2: Early Embryonic Development   28
Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to poly-spermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers

Unit 3: Late Embryonic Development   **8**

Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)

Unit 4: Post Embryonic Development   **12**

Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing: Concepts and Theories

Unit 5: Implications of Developmental Biology   **8**

Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis

DEVELOPMENTAL BIOLOGY
PRACTICALS (CREDITS 2)

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)

2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)

3. Study of the developmental stages and life cycle of *Drosophila* from stock culture
4. Study of different sections of placenta (photomicropgraph/ slides)

5. Project report on *Drosophila* culture/chick embryo development

CORE COURSE XIV
EVOLUTIONARY BIOLOGY

Course Learning Objective:

The study of evolutionary biology is essential for anyone who seeks to obtain an understanding of life and natural world. It is a unifying thread which joins all organisms from prokaryotes to

highest of eukaryotes. This course emphasizes on the development of evolutionary thought by dealing in general with the process and pattern of biological evolution. On one hand, it offers a chance to students to learn about deciphering evidences ranging from fossil records to molecular data and arranges them to establish phylogenetic relationships of species, while, on the other, it provides a platform to understand various forces which bring about variations among populations of a species and cause them to diversify into new species.

Course Learning Outcome:

Upon completion of the course, students should be able to:
- ❖ Acquire problem solving and high order analytical skills by attempting numerical problems as well as performing simulation studies of various evolutionary forces inaction.
- ❖ Apply knowledge gained, on populations in real time, while studying speciation, behaviour and susceptibility to diseases.
- ❖ Gain knowledge about the relationship of the evolution of various species and the environment they live in.
- ❖ Get motivated to work towards mitigating climate change so that well adapted species do not face extinction as a result of sudden drastic changes in environment.
- ❖ Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction.
- ❖ Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.
- ❖ Use various software to generate interest towards the field of bioinformatics and coding used in programming language

Course Content: THEORY
(CREDITS 4)

Unit 1:   **7**
Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes

Unit 2: 4
Historical review of evolutionary concept: Lamarckism, Darwinism, Neo-Darwinism

Unit 3: 10
Evidences of Evolution: Fossil record (types of fossils, transitional forms, geological time scale, evolution of horse, three domains of life, neutral theory of molecular evolution, molecular clock, example of globin gene family

Unit 4: 8
Sources of variations: Heritable variations and their role in evolution

Unit 5: 13
Basic concept of Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to human Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, kin selection, adaptive resemblances, sexual selection. Genetic Drift (mechanism, founder's effect, bottleneck phenomenon; Role of Migration and Mutation in changing allele frequencies

Unit 6: 7
Product of evolution: Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation—allopatric, sympatric, Adaptive radiation / macroevolution (exemplified by Galapagos finches)

Unit 7: 2
Extinctions; Back ground and mass extinctions (causes and effects), detailed example of K-T extinction

Unit 8: 6
Origin and evolution of man; Unique hominin characteristics contrasted with primate characteristics, primate phylogeny from Dryopithecus leading to Homo sapiens, molecular analysis of human origin

Unit 9: 2
Phylogenetic trees, multiple sequence alignment, construction of phylogenetic trees, interpretation of trees

VOLUTIONARY BIOLOGY
PRACTICALS
(CREDITS 2)

1. Study of fossils from models/ pictures

2. Study of homology and analogy from suitable specimens

3. Study and verification of Hardy-Weinberg Law by chi square analysis

4. Demonstration of role of natural selection and genetic drift in changing allele frequencies using simulation studies

5. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.

DISCIPLINE CENTRIC ELECTIVE COURSES
DSE 1
ANIMAL BEHAVIOUR AND CHRONOBIOLOGY

Course Learning Objective:

Animal Behaviour is the scientific study of the wild and wonderful ways in which animals interact with each other, with other living beings, and with the environment in which they live in. One important aspect pertaining to the studies on Animal Behaviour is that it can be conducted anywhere and at any time, depending on the interest of the researcher. Moreover, it is not confined to the four walls of the classroom or the laboratory. The behavioural biology has high applied value and currently linked to conservation biology, molecular biology, behavioural ecology and integrated pest management. The chronobiology addresses some periodic and cyclic nature of various life phenomena occurring in living beings in nature. They often correlate with the external environmental factors. Chronopharmacology, chronomedicine and chronotherapy are some of the direct applications of chronobiology in human health. This course aims to provide an overview of animal behaviour and chronobiology starting from historical perspective to types of behaviours and their evolutionary significance. The course also highlights types, mechanisms and importance of the biological rhythms and biological clocks operating in the living organisms. This

course will help the learners to understand and appreciate different types of animal behaviours, their adaptive, evolutionary and practical significance.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- ❖ Understand types of animal behaviour and their importance to the organisms.
- ❖ Enhance their observation, analysis, interpretation and documentation skills by taking short projects pertaining to Animal behaviour and chronobiology.
- ❖ Relate animal behaviour with other subjects such as Animal biodiversity, Evolutionary biology, Ecology, Conservation biology and Genetic basis of the behaviour.
- ❖ Understand various process of chronobiology in their daily life such as jet lag.
- ❖ Learn about the biological rhythm and their application in pharmacology and modern medicine.
- ❖ Realize, appreciate and develop passion to biodiversity; and will respect the nature and environment.

Course Content: THEORY (Credits 4)

Unit 1: Introduction to Animal Behaviour
Origin and history of Ethology; Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen, Proximate and ultimate causes of behavior.

Unit 2: Patterns of Behaviour
Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Unit 3: Social and Sexual Behaviour
Social Behaviour: Concept of Society; Communication and the senses; Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance. Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

Unit 4: Introduction to Chronobiology

Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period. Adaptive significance of biological clocks

Unit 5: Biological Rhythm

Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation seasonal reproduction of vertebrates; Role of melatonin.

Unit 6: Biological Clocks

Relevance of biological clocks; Chronopharmacology, Chronomedicine, Chronotherapy.

ANIMAL BEHAVIOUR AND CHRONOBIOLOGY
PRACTICAL (Credits 2)

1. To study nests and nesting habits of the birds and social insects.

2. To study the behavioural responses of wood lice to dry and humid conditions.

3. To study geotaxis behaviour in earthworm.

4. To study the phototaxis behaviour in insect larvae.

5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.

6. Study of circadian functions in humans (daily eating, sleep and temperature patterns).

DSE 2
IMMUNOLOGY

Course Learning Objective:

The aim of the course in immunology is to apprise the student with the working of the immune system in normal health and how it fights the disease and may sometimes contributes to disease. The immune system is incredibly complex. This course is hence designed to enable understanding the molecular and cellular basis of the development and function of the immune system and identification of its biological, clinical and therapeutic implications.

Course Learning Outcome:

After completion of the course the students will be able to:

❖ Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity

❖ Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses including the role of Major Histocompatibility Complex

❖ Explain the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory

❖ Understand the molecular basis of complex, humoral (Cytokines and Complement) and cellular processes involved in inflammation and immunity, in states of health and disease

❖ Describe basic and state-of-the-art experimental methods and technologies

❖ Integrate knowledge of each subsystem to see their contribution to the functioning of higher-level systems in health and disease including basis of vaccination, autoimmunity, immunodeficiency, hypersensitivity and tolerance

Course Content: THEORY
(Credits 4)

Unit 1: Overview of Immune System   **10**
Historical perspective of Immunology, Early theories of Immunology, Cells and organs of the Immune system

Unit 2: Innate and Adaptive Immunity   **10**
Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity, Immune dysfunctions (brief account of autoimmunity with reference to Rheumatoid Arthritis and tolerance, AIDS).

Unit 3: Antigens   **8**

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes

Unit 4: Immunoglobulins   **12**

Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays (ELISA and RIA), Polyclonal sera, Hybridoma technology: Monoclonal antibodies in therapeutics and diagnosis

Unit 5: Major Histocompatibility Complex

        7

Structure and functions of MHC molecules. Endogenous and exogenous pathways of antigen processing and presentation

Unit 6: Cytokines

        4

Properties and functions of cytokines, Therapeutics Cytokines

Unit 7: Complement System

        4

Components and pathways of complement activation.

Unit 8: Vaccines

        5

Various types of vaccines.

IMMUNOLOGY
PRACTICAL (Credits 2)

1. Demonstration of lymphoid organs (by video)

2. Histological study of spleen, thymus and lymph nodes through slides/ photographs

3. Preparation of stained blood film to study various types of blood cells.

4. Ouchterlony's double immuno-diffusion method.

5. ABO blood group determination.

6. Demonstration of ELISA

* The experiments can be performed depending upon usage of animals in UG courses.

DSE 3
ANIMAL BIOTECHNOLOGY

Course Learning Objective:

Biotechnology is the advanced branch of biological sciences which mostly deals with technological application on biological systems. It is basically the management of biological processes for industrial and other human welfare purposes. The present paper on biotechnology attempts to give a wholesome idea of biotechnology at a basic level. It provides a tool kit in the form of a number of various techniques and processes developed over time to solve problems involving primarily human welfare with focus on health and medicine. It will equip the students with basic tools of biotechnology which are a must for everyone interested in pursuing a career in biotechnology. It makes one aware of the scope of this field which encompasses almost every field of science like engineering, research, commercialization and academics.

Course Learning Outcome:

Upon completion of the course, students should be able to:

- ❖ Use or demonstrate the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc.
- ❖ Make a strategy to manipulate genetic structure of an organism for the improvement in any trait or its well-being based on the techniques learned during this course.
- ❖ Understand better the ethical and social issues regarding GMOs.
- ❖ Use the knowledge for designing a project for research and execute it.

Course Content: THEORY
(Credits 4)

Unit 1.Introduction   **8**
Concept and scope of biotechnology

Unit 2.Molecular Techniques in Gene manipulation   **24**

Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics).Restriction enzymes: Nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern blotting, DNA sequencing: Sanger method Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Unit 3. Genetically Modified Organisms   18

Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice. Applications of transgenic plants: insect and herbicide resistant plants.

Unit 4. Culture Techniques and Applications   10

Animal cell culture, expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia) Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy

ANIMAL BIOTECHNOLOGY
PRACTICAL (Credits 2)

1. Genomic DNA isolation from *E. coli*

2. Plasmid DNA isolation (pUC 18/19) from *E. coli*

3. Restriction digestion of plasmid DNA.

4. Construction of circular and linear restriction map from the data provided.

5. Calculation of transformation efficiency from the data provided..

6. To study following techniques through photographs

a. Southern Blotting

b. PCR

c. DNA fingerprinting

7. Project report on animal cell culture

DSE 4

COMPUTATIONAL BIOLOGY

Course Learning Objective:

This course offers an overview of fundamental concepts of Bioinformatics and Biostatistics. An interdisciplinary program, it emphasizes integration of Computer Science with Biology and introduces the students to various computational methods and software tools for understanding biological databases, gene sequence alignments, gene annotation, protein structure predictions, drug discovery, molecular phylogeny, metagenomics, etc. The broad aim of this course is to make students get basic hands-on training and develop skill-set required for computational analysis of biological data. Recently many interest groups, such as governments, universities, research institutes and industries find Bioinformatics as a crucial area of research and development due to generation of large-scale genome sequencing data. In view of above, this course is designed to motivate the undergraduate students to pursue postgraduate program in Bioinformatics and Biostatistics.

Course Learning Outcome:

After completion of the course the students will be able to:

- ❖ Explain the basic concepts of Bioinformatics and Biostatistics and its various applications in different fields of biological sciences
- ❖ Describe theoretically sources of biological data, and list various biological databases – nucleic acids, protein sequence, metabolic pathways and small molecule
- ❖ Identify various file formats of sequence data and tools for submission of data in databases as well as retrieval of gene and protein data from databases
- ❖ Annotate gene sequence and protein structure prediction
- ❖ Perform and explain the underlying mechanisms of pair-wise and multiple sequence alignments and determine phylogenetic relationships
- ❖ Describe various computational tools and methodologies and their application in structural bioinformatics, functional genomics and *in silico* drug discovery

❖ Measure variability (standard deviation, standard error, co-efficient of variance) and hypothesis testing (Z-test, t-Test, chi-square test)

Course Content: THEORY
(Credits 4)

Unit 1: Introduction to Bioinformatics   5
Importance, Goal, Scope; Genomics, Transcriptomics, Systems Biology, Functional Genomics, Metabolomics, Molecular Phylogeny; Applications and Limitations of Bioinformatics

Unit 2: Biological Databases   10
Introduction to biological databases; Primary, secondary and composite databases; Nucleic acid databases (GenBank, DDBJ, EMBL and NDB); Protein databases (PIR, SWISS-PROT, TrEMBL, PDB); Metabolic pathway database(KEGG, EcoCyc, and MetaCyc); Small molecule databases (Pub Chem, Drug Bank, ZINC, CSD)

Unit 3: Data Generation and Data Retrieval   14
Generation of data (Gene sequencing, Protein sequencing, Mass spectrometry, Microarray), Sequence submission tools (BankIt, Sequin, Webin); Sequence file format (flat file, FASTA, GCG, EMBL, Clustal, Phylip, Swiss-Prot); Sequence annotation; Data retrieval systems (SRS, Entrez)

Unit 3: Basic Concepts of Sequence Alignment   14
Scoring Matrices (PAM, BLOSUM), Methods of Alignment (Dot matrix,Dynamic Programming, BLAST and FASTA); Local and global alignment, pairwise and multiple sequence alignments; Similarity, identity and homology ofsequences.

Unit 4: Applications of Bioinformatics   7
Structural Bioinformatics (3-D protein, PDB), Functional genomics (genome-wide and high throughput approaches to gene and protein function), Drug discovery method (Basic concepts)

Unit 5: Biostatistics   **10**

Introduction, calculation of standard deviation, standard error, Co-efficient of Variance, Chi-square test, Z test, t-Test

COMPUTATIONAL BIOLOGY
PRACTICAL (Credits 2)

1. Accessing biological databases

2. Retrieval of nucleotide and protein sequences from the databases.

3. To perform pair-wise alignment of sequences (BLAST) and interpret the output

4. Translate a nucleotide sequence and select the correct reading frame of the polypeptide from the output sequences

5. Predict the structure of protein from its amino acid sequence.

6. To perform a —two-sample t- test‖ for a given set of data

7. To learn graphical representations of statistical data with the help of computers (e.g. MS Excel).

GE 2

ANIMAL DIVERSITY

Course Learning Objective:

Zoology is the scientific study of animal life. Animals are the most diverse creatures on this planet. This course gives a framework for understanding the diversity within different groups, and interrelationship among different species and genera within each group. The aim of this course is to understand the importance of animal kingdom in context to hierarchy, body plan and their role in ecological development. This course provides an overview of the invertebrate and vertebrate animals, including sponges, cnidarians, flatworms, nematodes, annelids, molluscs, arthropods, echinoderms, invertebrate chordates, fishes, amphibians, reptiles, birds, and mammals. This paper comprises of 15 units. First nine units provide knowledge of coelom formation, different level of organization, different modes of living, evolutionary changes of Non-chordates and their salient features. Whereas, remaining units will impart knowledge on different classes of chordates. After

completion of this course, the learners will have a framework for understanding all of the different types of animals, and the characteristics of each.

Course Learning Outcome:

Upon completion of the course, students will be able to:

- ❖ Distinguish between major phyla of animals through a demonstrated understanding of their taxonomic classification and diversity.
- ❖ Describe the distinguishing characteristics of all major phyla.
- ❖ Understand the fundamental differences among animal body plans and relate them to function, taxonomic classification, and evolutionary relationships among phyla.
- ❖ Illustrate lifecycles, structure, function and reasons for importance of few representative organisms from different groups of animals.
- ❖ Identify anatomical structures from prepared tissues.
- ❖ Observe living animals in the environment and relate observations to theory from the course.
- ❖ Recognize major animal phyla and animals on the basis of their external characteristics.

Course Content: THEORY
(CREDITS 4)

Unit 1. Protista   4

General characters of Protozoa; Life cycle of Plasmodium

Unit 2. Porifera   3

General characters and canal system in Porifera

Unit 3. Radiata   3

General characters of Cnidarians and polymorphism

Unit 4. Acoelomates   3

General characters of Helminthes; Life cycle of Taenia solium

Unit 5. Pseudocoelomates   3

General characters of Nemethehelminthes; Parasitic adaptations

Unit 6. Coelomate Protostomes   3
General characters of Annelida ; Metamerism.

Unit 7. Arthropoda   **4**

General characters. Social life in insects.

Unit 8. Mollusca   **3**

General characters of mollusca; Pearl Formation

Unit 9. Coelomate Deuterostomes   **3**

General characters of Echinodermata, Water Vascular system in Starfish.

Unit 10. Protochordata   **2**

Salient features

Unit 11. Pisces   **4**

Osmoregulation, Migration of Fishes

Unit 12. Amphibia   **4**

General characters, Adaptations for terrestrial life, Parental care in Amphibia.

Unit 13.   **5**

Amniotes; Origin of reptiles. Terrestrial adaptations in reptiles.

Unit 14. Aves: **5**

The origin of birds; Flight adaptations

Unit 15. Mammalia   **6**

Early evolution of mammals; Primates; Dentition in mammals.

PRACTICAL (CREDITS 2)

1. Study of following specimens:

Non Chordates: Euglena, Noctiluca, Paramecium, Sycon, Physalia, Tubipora, Metridium, Taenia, Ascaris, Nereis, Aphrodite, Leech, Peripatus, Limulus, , Hermitcrab, Daphnia, Millipede, Centipede, Beetle, Chiton, Dentalium, Octopus, Asterias, and Antedon. Chordates: Balanoglossus, Amphioxus, Petromyzon, Pristis, Hippocampus, Labeo, Icthyophis/Uraeotyphlus, Salamander, Rhacophorus Draco, Uromastix, Naja, Viper, model of Archaeopteryx, any three common birds-(Crow, duck, Owl), Squirrel and Bat. 2. Study of following Permanent Slides: Cross section of Sycon, Sea anemone and Ascaris (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva.

3. Temporary mounts of

Septal & pharyngeal nephridia of earthworm.Unstained mounts of Placoid, cycloid and ctenoid scales.

4. Dissections of

Digestive and nervous system of Cockroach. Urinogenital system of Rat.

GE 2

FOOD, NUTRITION AND HEALTH

Course Learning Objective:

The prime focus is to provide the students with a basic understanding of the relationship between food, nutrition and health. It is imperative that focus should be on realistic issues faced by people with respect to nourishment at all stages of life. Unhealthy eating habits particularly the shift from fresh food consumption to packaged foods with added salts and preservatives have contributed to the obesity epidemic in nearly all parts of the world. It is important to understand this link and change eating habits in accordance to one`s age, pregnancy, lactation and physical activity. By taking steps to eat healthy, one can obtain the nutrients required by the body to stay healthy, active, and strong. Mental health is also affected largely by our lifestyle. Apart from physical activity, the intake of the required vitamins, minerals and anti-oxidants also nourish the brain. Malnutrition is the main cause of impairment of growth in young children and infants and leads to diseases like Marasmus. Moreover, food hygiene including food and water borne infections along with food spoilage has also been covered in this course.

Course Learning Outcome:

Upon the completion of the course, students will be able to:

- ❖ Have a better understanding of the association of food and nutrition in promoting healthy living.

- ❖ Think more holistically about the relationship between nutrition science, social and health issues.
- ❖ Move on to do post-graduation studies and can apply for jobs as food safety officers, food analysts, food inspectors, food safety commissioners or controllers for jobs in organizations like FSSAI.
- ❖ Specialize in various fields of nutrition.

Course Content: THEORY (Credits 4)

Unit 1: Basic concept of food and nutrition   10
Food Components and food-nutrients; Concept of a balanced diet, nutrient needs and dietary pattern for various groups-adults, pregnant and nursing mothers, infants, school children, adolescents and elderly

Unit 2: Nutritional Biochemistry: 20
Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role Vitamins- Fat-soluble and Water-soluble vitamins- their dietary source and importance Minerals-Iron, calcium, phosphorus, iodine, selenium and zinc: their biological functions

Unit 3: Health   15
Introduction to health- Definition and concept of health; Major nutritional Deficiency diseases-Protein Energy Malnutrition (kwashiorkor and marasmus), Vitamin A deficiency disorders, Iron deficiency disorders, Iodine deficiency disorders- their causes, symptoms, treatment, prevention and government programmes, if any. Life style related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary and lifestyle modifications; Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS) - their causes, treatment and prevention; Common ailments- cold, cough, and fevers, their causes and treatment

Unit 4: Food hygiene: 15
Potable water- sources and methods of purification at domestic level; Food and Water borne infections: Bacterial infection: Cholera, typhoid fever, dysentery; Viral infection: Hepatitis,

Poliomyelitis, Protozoan infection: amoebiasis, giardiasis; Parasitic infection: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention

Brief account of food spoilage: Causes of food spoilage and their preventive measures

PRACTICAL (Credits 2)

1. Estimation of Lactose in milk

2. Ascorbic acid estimation in food by titrimetry

3. Estimation of Calcium in foods by titrimetry

4. Study of the stored grain pests from slides/ photograph (*Sitophilus oryzae, Trogoderma granarium, Callosobruchus chinensis and Tribolium castaneum*): their identification, habitat and food sources, damage caused and control. Preparation of temporary mounts of the above stored grain pests.

5. Project- Undertake computer aided diet analysis and nutrition counselling for different age groups.

OR

Identify nutrient rich sources of foods (fruits and vegetables), their seasonal availability and price

OR

Study of nutrition labelling on selected foods

GE 3

HUMAN PHYSIOLOGY

Course Learning Objective:

The students will be introduced to the principles of normal biological function in human body. Basic human physiology will be outlined and correlated with histological structures. Students will be exposed to the concept of how animals maintain an internal homeostatic state in response to changes in their external environment. Hands-on practical skills useful in routine life will be inculcated among students. Students will be encouraged for subsequent biological courses that require an understanding of the physiology of organisms.

Course Learning Outcome:

Upon completion of the course, students will be able to:

- ❖ Know the principles of normal biological function in human body.
- ❖ Outline basic human physiology and correlate with histological structures.
- ❖ Understand how animals maintain an internal homeostatic state in response to changes in their external environment.

Course Content: THEORY (CREDITS 4)

Unit 1: Digestion and Absorption of Food   **12**

Structure and function of digestive glands; Digestion and absorption of carbohydrates, fats and proteins; Nervous and hormonal control of digestion (in brief)

Unit 2: Functioning of Excitable Tissue (Nerve and Muscle)   **10**

Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fibre); Structure of skeletal muscle, Mechanism of muscle contraction (Sliding filament theory), Neuromuscular junction

Unit 3: Respiratory Physiology   **6**

Ventilation, External and internal Respiration, Transport of oxygen and carbon dioxide in blood, Factors affecting transport of gases.

Unit 4: Renal Physiology   **8**

Functional anatomy of kidney, Mechanism and regulation of urine formation,

Unit 5: Cardiovascular Physiology   **10**
Structure of heart, Coordination of heartbeat, Cardiac cycle, ECG

Unit 6: Endocrine and Reproductive Physiology   **14**

Structure and function of endocrine glands (pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries, and testes), Brief account of spermatogenesis and oogenesis, Menstrual cycle

HUMAN PHYSIOLOGY
PRACTICAL (CREDITS 2)

1. Preparation of temporary mounts: Neurons and Blood film.

2. Preparation of haemin and haemochromogen crystals.

3. Estimation of haemoglobin using Sahli's haemoglobinometer.

4. Study of permanent histological sections of mammalian oesophagus, stomach, duodenum, rectum, lung, kidney, thyroid, pancreas, adrenal, testis, and ovary.

GE 4

ENVIRONMENT AND PUBLIC HEALTH

Course Learning Objective:

Health is wealth but this wealth is directly affected by the environment. Environmental issue that affects human health is the most important trigger that has led to the urgency of conservation of environment. All the aspects of human health, including quality of life are determined by physical, chemical, biological, social and psychological factors in environment. The sustenance of environment is the key to development of future of mankind. This course aims to create awareness among students about the necessity conservation of Mother Nature. The main objective of the syllabus is to assess, correct, control and prevent those factors that can adversely affect environment and hence health of present and future generation.

Course Learning Outcome:

Upon completion of course, students will be able to:

• Get familiarized with various aspects of environmental risks and hazards.

 • Recognize the climate change due to human activities.

 • Be aware about the various impacts of environmental degradation on human health through case studies and how it can be prevented.

• Learn about the nuclear and chemical disasters and their after effects through cases studies.

• Know various waste management technologies and their utility.

• Understand the diagnostic methods of various diseases and ways to prevent them.

• Realize the importance of nature conservation for betterment of human race and all living beings.

Course Content: THEORY (Credits 4)

UNIT I: Introduction

12

Sources of Environmental hazards, hazard identification and accounting, fate of toxic and persistent substances in the environment, dose Response Evaluation, exposure Assessment.

UNIT II Climate Change   10

Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health

Unit III Pollution   10

Air, water, noise pollution sources and effects, Pollution control

Unit IV Waste Management Technologies   18

Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants, Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath.

Unit 5 Diseases   10

Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid.

ENVIRONMENT AND PUBLIC HEALTH
PRACTICAL (Credits 2)

1. To determine pH, Cl, SO_4, NO_3 in soil and water samples from different locations.

PROGRAM OUTCOME

1. Commercial Knowledge: Demonstrate interest in and at least a basic understanding of the business world and the industry you desire to work within. It also helps to have awareness surrounding the importance of things that affect a business.

This includes the ability to-

- Be aware commercially.
- Incorporate key commercial skills.
- Demonstrate the value for understanding the business performance in the market.

2. Problem Analysis: Demonstrate the Logical sequence for solving problems and improving the quality of decisions. It is also a guide to identifying which tools and techniques to apply for value based inferences.

This includes the knowledge for -

- Producing a clear statement of the identified problem/opportunity.
- Establishing a process for continuous improvement and holding the gains.
- Gathering all necessary information associated with a problem/opportunity.
- Implementing and testing a plan.
- Enabled man to satisfy his innumerable wants and thereby promoting social welfare.

3. Conduct Investigation of Complex Problems: Engaged in investigating the complex problems associated with the business. Also demonstrate the process tools and technique for the solution of complex problems associated with decision making, tax planning, and budget preparation etc.

This includes the ability to –

- Engaged effectively with the solution of complex problems in the light of the concepts, principles and ethics.

4. Modern Tool Usages: Demonstrate the tools and technique used in the business and business decision making.

This includes –

- The tools like PERT & CPM in the management of projects

- Different techniques for controlling the expenditures.

5. Commerce and Society: Understand the values that help to increase the standard of living and quality of life.
This also includes the ability to -
- Expansion and modernization of aids to trade.
- Link producers and consumers through retailers and wholesalers and also through the aids to trade.

6. Environment and Sustainability: Demonstrate a broad and flexible educational preparation for a range of professional, business-related careers in private and public enterprise.
This includes the ability to-
- Demonstrate an appreciation of the broad environment in which business operates.
- Contribute effectively to the successful operation of a business.
- Apply analytical skills, relevant theory and logical thought to decision making processes within a business.
- Communicate effectively in a business environment, both verbally and in writing.
- Demonstrate commitment to ethical and socially responsible business practice.
- Demonstrate detailed understanding of theory and practice in key business specializations.
- Apply specialist skills to analyze issues and develop appropriate reports or other documentation.

7. Ethics: Demonstrate the value and principles of business for implementing the same in to the reality.
This also includes the ability –
- Provide a basic foundation for developing a business concern and business practices.
- Understand the perpetual succession of the business.

8. Individual And Team Work: Function effectively as an individual and as a member or leader of diverse teams and in multi-disciplinary settings.

9. Effective Communication: Demonstrate the ability to extract and convey information accurately in variety formats for successful business implementation.
This includes the ability to-

- Communicate concepts and information clearly and in various formats

10. Project Management and Finance: Demonstrate the plan, co-ordination and control of the complex and diverse activities of modern industrial and commercial projects.
This also includes the ability to-

- Provide a structure for goals and objectives

11. Life Long Learning: Acquire the ability to engage in independent and lifelong learning in broad context of socio-technological changes

12. Growth Of Business Skill: Demonstrate the basic foundation for the startup of a business and the strategic decisions for the same.
This includes the ability to-

- Understand the dynamic strategy formulation for the business.
- Investment decisions.
- Performance evaluation and decision making

13. Proper Use of Finance and Accounts: Understand how finance plays a crucial role in the business and the preparation of proper accounts provides a base for evaluation the same.
This also include the ability for-

- Investment decision making.
- Budget preparation and execution.
- Performance evaluation.
- Audit of the accounts

14. Mentality for Business Venture: Understand the value of business culture for the maximization of wealth and profit that enlighten the financial independence and security.

This includes the ability to –

- Start a new venture.

- Wealth and profit maximization

PROGRAM SPECIFIC OUTCOME

PSO 1: To explain, and integrate fundamental concepts underlying accounting, finance, management, marketing, and economics. Use information to support business processes and practices, such as problem analysis and decision making. Apply quantitative skills to help analyze and solve business problems and to take advantage of business opportunities. Develop an understanding of internal control issues and the effects of the regulatory environment on financial reporting. Apply knowledge of generally accepted accounting principles (GAAP) and managerial accounting theories to business organizations, state and local.

PSO 2: Business Law is designed to expose the student to the American Legal System and it's affect on business activities. Demonstrate an understanding of the Legal Environment of Business.. Apply basic legal knowledge to business transactions. Communicate effectively using standard business and legal terminology.

PSO 3: Understand the fundamentals of microeconomics. Get an introduction to supply and demand and the basic forces that determine equilibrium in a market economy. Get introduced to the framework for learning about consumer behavior and analyzing consumer decisions. To study about firms and their decisions about optimal production. To solve basic microeconomic problems, Use the fundamental techniques to think about a number of policy questions related to the operation of the real economy. To understand introductory microeconomic theory in a local, regional, national and international scenario. Get an introduction to supply and demand and the basic forces that determine equilibrium in a market economy.

PSO 4: To make them understand the accounts of the various adjustments related to share capital. To prepare the final accounts of Joint Stock companies. To explain the concepts of

Amalgamation and External Reconstruction. Prepare the accounts of companies on the event of internal reconstruction.

PSO 5: Corporate Law has been specifically designed to provide not only an overview but also an in-depth knowledge about incorporation, raising capital by companies, borrowings and investments by companies, foreign direct investment in Indian companies, corporate restructuring, corporate insolvency and other related important issues.

PSO 6: To explain the concepts of Macroeconomics and its interrelations with Microeconomics. Associate the current economic phenomenon with existing theory and put their views on contemporary economic issues. Apply the principle of Macroeconomics in explaining the behavior of Macroeconomic variables at national as well as global level.

PSO 7: To develop the understanding of the concept of human resource management and to understand its relevance in organizations. To develop necessary skill set for application of various HR issues. To analyze the strategic issues and strategies required to select and develop manpower resources. To integrate the knowledge of HR concepts to take correct business decisions. Integrated perspective on role of HRM in modern business. Ability to plan human resources and implement techniques of job design. Competency to recruit, trains, and appraise the performance of employees. Rational design of compensation and salary administration. Ability to handle employee issues and evaluate the new trends in HRM.

PSO 8: To collect the basic concepts and definitions of Income Tax Act 1961. To know the residential status of assesse and incomes exempted from tax. To familiar with the computation of income from salary. To make them familiar with the computation of income from house property, computation of income from business and profession, computation of capital gain, computation of income from other sources, to know about the aggregation of income and deduction u/s 80C to 80U C, to know about the assessment of individuals, to make them aware about the income tax authorities and their powers and duties.

PSO 9: To enable the students to study the evolution of Management. To study the functions and principles of management. To learn the application of the principles in an organization. To enable the effective and barriers communication in the organization. To make them study the system and process of effective controlling in the organization.

PSO 10: To describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis. Critically evaluate the underlying assumptions of analysis tools. Understand and critically discuss the issues surrounding sampling and significance. Discuss critically the uses and limitations of statistical analysis. Solve a range of problems using the techniques covered. Conduct basic statistical analysis of data.

PSO 11: To Recognize the impact of Information and Communication Technologies, on the Internet in business Operations. Acquire knowledge in identifying the main business and marketplace models for electronic Communications and Trading. Understanding Electronic Payment System and its environment. Make ethical decisions related to ecommerce based on laws, privacy, and security. Analyze the steps, tools, and security considerations needed create an E- commerce websites.

PSO 12: To understand the concept of costing and related terms. To make them familiar with the estimation & controlling of material cost, and with the estimation of overhead cost. To make them understand the estimation and controlling of labor cost. To make them able to prepare cost sheet.

PSO 13: Define basic terms in the areas of business calculus and financial mathematics. Explain basic methods of business calculus, types and methods of interest account and their basic applications in practice. Solve problems in the areas of business calculus, simple and compound interest account, use of compound interest account, loan and consumer credit. Discern effects of various types and methods of interest account. Connect acquired knowledge and skills with practical problems in economic practice.

PSO 14: The student will be able to identify Computer Concepts terminology and concepts; basic operating system functionality and terminology; and internet browsers functionality. Apply basic and advanced formatting techniques skills to produce word processing documents, including Letters and Memos, Business Reports, Flyers, Newsletters. Demonstrate basic skills involving spreadsheet functions; create formulas, charts, and graphs; manipulate data; and generate reports including AutoFill, Absolute Cell References, Grouping sheets and linking formulas. Develop a database; create and format tables, queries, and reports; and enter and modify table data.

PSO 15: To help them in developing ideas of the basic characteristics of Indian economy, it's potential on natural resources. Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development. Grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government. Understand agriculture as the foundation of economic growth and development; analyze the progress and changing nature of agricultural sector and its contribution to the economy as a whole. Not only be aware of the economy as a whole, they would understand the basic features of Mizoram's economy, sources of revenue, how the state government finance its programmes and projects.

PSO 16: Understand entrepreneurship concept as a whole. Explain the role and importance of the small and medium sized enterprises in the economy. Apply the various concepts to an understanding of new business creation and growth. Understand business planning concept as a whole.

PSO 17: To help them understand retailing, the entities involved, and the impact of decisions on a retail business. Analyze the evolution of the retail industry. Recognize career opportunities available in the retail businesses. Explain the concept of strategic planning within the retail management decision process. List the classification characteristics of various types of retailers by ownership. Compare and contrast single channel, multi-channel, and omni- channel retailing.

PSO 18: To enhance the abilities of learners to develop the concept of management accounting and its significance in the business. To enhance the abilities of learners to analyze the financial statements. To enable the learners to understand, develop and apply the techniques of management accounting in the financial decision making in the business corporates. To make the students develop competence with their usage in managerial decision making and control. To develop various skills among the students related with budget and budgetary control.

PSO 19: Students should able to elaborate the concept of Industrial Relations. The students should able to illustrate the role of trade union in the industrial setup. Students should able to outline the important causes & impact of industrial disputes. Students should able to elaborate Industrial Dispute settlement procedures. Student should be able to summarize the important

provisions of Wage Legislations, in reference to Payment of Wages Act 1936, Minimum Wages Act 1948 & Payment of Bonus Act 1965. Student should able to summarize the important provisions of Social Security Legislations, in reference to Employees State Insurance Act 1948, Employees Provident Fund Act 1952, and Payment of Gratuity Act 1972.

PSO 20: It will help the students in identifying the major influences in consumer behavior. To distinguish between different consumer behavior influences and their relationship. Establish the relevance of consumer behavior theories and concepts to marketing decision. Implement appropriate combinations of theories and concepts. To help them recognize social and ethical implications of marketing actions on consumer behavior. Use most appropriate techniques to apply market solutions.

PSO 21: To develop the skill among the learners about final accounts of banking companies, provisioning of non-performing assets, form and requirements of final accounts. To provide information to learners about accounting and statutory requirements of General insurance companies. To provide information to learners about accounting and statutory requirements of Life insurance companies.

PSO 22: It will help the students in understanding human resources development (HRD) and its theories, the difference between education, training, learning and the concept of the transfer of learning. Critique the relationship between organizational development (OD) and HRD contribution to organizational effectiveness. Apply and evaluate a learning process starting with training needs analysis to assessment and evaluation process. Evaluate the HRD role dealing with contemporary challenges.

PSO 23: To provide a theoretical and practical background in the field of investments. Designing and managing the bond as well as equity portfolios in the real word. Valuing equity and debt instruments. Measuring the portfolio performances.

PSO 24: Students should able to elaborate the concept of Industrial Relations. The students should able to illustrate the role of trade union in the industrial setup. Students should able to outline the important causes & impact of industrial disputes. Students should able to elaborate Industrial Dispute settlement procedures. Student should be able to summarize the important provisions of Wage Legislations, in reference to Payment of Wages Act 1936, Minimum Wages

Act 1948 & Payment of Bonus Act 1965. Student should able to summarize the important provisions of Social Security Legislations, in reference to Employees State Insurance Act 1948, Employees Provident Fund Act 1952, and Payment of Gratuity Act 1972.

PSO 25: Demonstrate an extended understanding of the similarities and differences in service-based and physical product based marketing activities. Demonstrate knowledge of the extended marketing mix for services. Develop and justify marketing planning and control systems appropriate to service-based activities. Specify, analyze and select markets for specific service products. Prepare, communicate and justify marketing mixes and information systems for service-based organizations. Demonstrate integrative knowledge of marketing issues associated with service productivity, perceived quality, customer satisfaction and loyalty.

PSO 26: Analyze relevant economic concepts and economic models which inform the study of microeconomics. Apply the principles of microeconomics associated with supply and demand in determining market equilibrium and the effects of price controls and elasticity. Apply the principles of microeconomics associated with production and consumption in determining the behavior of individuals and producers in successful markets and situations where markets fail or contribute to income inequality. Analyze market structures and apply theoretical concepts of perfect competition to identify the behavior of monopolies and imperfect competition. Analyze resource markets to understand the decision-making of resource allocation and interrelationships among key markets in the economy.

PSO 27: To familiarize the students regarding various dimensions of salesmanship and career opportunities available in these fields. To develop practical understanding among the students associated with salesmanship through classroom discussion/ participation and projects. To develop transferrable skills among the students for managing sales operation efficiently so that they could be ready to join the sales functions in any organization. To provide knowledge to students in concise and understandable format so that students could learn and apply these concepts in their career for the growth. To provide brief insight about personal selling and its stages, meaning and importance of knowledge of industry and company product and customers and other key dimensions of sales management like sales organization, motivation and compensation.

PSO 28: It will help the students in understanding how financial measures of corporate performance are calculated and used to assess credit worthiness of a business. The course covers the basics of financial statement analysis and enables participants to confidently use financial ratios and financial terminology. This is designed for users of financial reports and accounts who have no prior or limited knowledge of corporate financial information; it focuses on the numbers behind the risks rather than the risks themselves. Understand the impact of financial reporting choices on the usefulness of reported earnings to predict future performance.

PSO 29: The students will learn the meaning and objective of Trade Unionism, its functions, social responsibilities, its Importance, growth and origin of trade unions in India. All India Trade Union Congress, Hind Mazdoor Sabha, etc. And the structure and problems faced by the trade unions in India.

PSO 30: It will enlighten the students in understanding the meaning and the different types of advertisement. Identify key players in advertising industry. Discuss the ethics in advertisement. Identify and make decisions regarding the most feasible advertising appeal and media mix. Conduct pre-testing, post testing and concurrent testing of ads to determine their effectiveness. Identify the dealer oriented promotion techniques, customer oriented promotion techniques and the salesmen oriented promotion techniques. Describe different types of sales persons. Explain the steps involved in sales force management, etc.

COURSE OUTCOME

COURSE CODE: C 101

CO-1: helps to understand the Theoretical framework for Accounting, Accounting processes and Computerized Accounting system.
CO-2: makes familiar in measurement of Business Income, Revenue Recognition, Depreciation Accounting and preparation of final accounts.
CO-3: makes familiar with the accounting practices relating to hire purchase and installment purchase system.
CO-4: provide insight into the accounting and preparation of branch accounts under different methods.

CO-5: be proficient in Accounting of Dissolution of the Partnership Firm Including Insolvency of partners, sale to a limited company and piecemeal distribution

COURSE CODE: C 102

CO-1: makes familiar with General Principle of Law of Contract of The Indian Contract Act, 1872.

CO-2: makes familiar with Specific Contract of The Indian Contract Act, 1872.

CO-3: provide a brief idea about Sale of Goods Act, 1930.

CO-4: makes familiar with Partnership Laws through The Partnership Act,1932 and The Limited Liability Partnership Act,2008

CO-5: gives an idea about the laws negotiable instruments through Negotiable Instruments Act, 1881.

COURSE CODE: G 101

CO-1: provide a theoretical framework about Revenue, Elasticity of Demand and Consumer behavior.

CO-2: makes familiar with the concepts of production and cost including Economies and diseconomies of scale.

CO-3: provide insight into market structure and price determination in case of perfect competition.

CO-4: provide insight into market structure and price determination in case of Monopoly.

CO-5: provide insight into market structure and price determination in case of Imperfect competition.

COURSE CODE: C 203

CO-1: provide understanding on accounting of shares and debentures along with redemption according to Companies Act, 2013.

CO-2: enables in preparation of financial statements of companies in accordance with accounting standards and IFRS.

CO-3: provide understanding on Valuation of Goodwill and Valuation of Shares and Cash flow Statement.

CO-4: provide understanding on accounting for amalgamation and internal reconstruction of companies.

CO-5: makes proficient in accounting of holding companies and preparation of consolidated financial statements.

COURSE CODE: C 204

CO-1: provide insight into Administration of Company Law including National Company Law Tribunal (NCLT), National Company Law Appellate Tribunal (NCLAT), and special Courts.

CO-2: makes familiar with the Documents regarding Memorandum of association, Articles of association, Doctrine of constructive notice and indoor management and prospectus.

CO-3: provide understanding on the Management of a Company.

CO-4: makes familiar with the Accounts and Audit of a Company and modes of Winding up of a Company.

CO-5: makes familiar with Depositories Law through The Depositories Act 1996.

COURSE CODE: G 202

CO-1: provide insight into the concepts of Macro Economics and Static macroeconomic analysis both short and the long run.

CO-2: provide understanding on the Economy in the short run including fiscal policy, monetary policy determination of aggregate demand.

CO-3: makes familiar with the Inflation, Unemployment and Labour market.

CO-4: makes familiar with the Open economy and models.

CO-5: provide insight into Behavioral Foundations including Investment and demand and supply of money.

COURSE CODE: AE 101

CO-1: gives an idea about the basic forms of communication and also about the barriers of communication.

CO-2: makes proficient in writing Business Correspondence like letter writing, Memorandum, Job application letter, preparing the Resume.

CO-3: makes familiar with writing Business reports.

CO-4: makes proficient in Vocabulary regarding Words often confused, Words often misspelt, and Common errors in English.

CO-5: makes familiar with the Oral Presentation including Importance, Characteristics, Presentation Plan, Power point presentation, Visual aids.

COURSE CODE: AE 202

CO-1: provide understanding on the Ecosystems and Environmental Problems.

CO-2: makes familiar with Natural Resources and Biodiversity and its Conservation.

CO-3: gives an idea about the Environmental Pollution and includes Environmental Protection Act and International agreements.

COURSE CODE: C 305

CO-1: gives an idea about the concepts of Human Resource Management and Emerging Challenges of Human Resource Management;

CO-2: provide understanding on the Human Resource Planning, job analysis and recruitment and selection of Human Resource.

CO-3: provide understanding on the Training and Development of Human Resource.

CO-4: gives an idea about the Modern techniques of performance appraisal, job evaluation and methods of wage payments and incentive plans.

CO-5: makes familiar with the Industrial relations and Industrial Disputes: causes and settlement machinery.

COURSE CODE: C 306

CO-1: understand the basic concepts Income Tax, Residential status and exempted income under section 10.

CO-2: proficient for Computation of Income from Salary and Income from House Property

CO-3: proficient for Computation of Income from Profits and gains of business or profession; Capital gains and Income from other sources.

CO-4: makes familiar with the Computation of Total Income and Tax Liability including Aggregation of income and set-off and carry forward of losses;

CO-5: gives an idea about the Preparation of online filing of Income Tax return.

COURSE CODE: C 307

CO-1: familiarizes with management concept, thoughts, theories and approaches.

CO-2: provide understanding on planning, decision-making and management by objectives.

CO-3: familiarizes with organizing concept and structure of organization

CO-4: provide insight into motivation and leading people at work.

CO-5: makes familiar with the concept and techniques of control and emerging issues in Management.

COURSE CODE: G 303

CO-1: makes proficient in analysis of univariate, bivariate and multivariate data including time-series and cross-sectional data and provide reasonable working knowledge on central tendency and measures of dispersion.

CO-2: provide understanding on Probability and Probability Distributions including binominal, poisson and normal distributions.

CO-3: provide insight into the Correlation Analysis and Regression Analysis including standard error.

CO-4: provide working knowledge on index numbers and methods of constructing price and quantity indices including share prices indices, BSE SENSEX and NSE NIFTY.

CO-5: enables in analysis of time series data including seasonal variations.

CO-6: provide understanding on Sampling Concepts, Sampling Distributions and Estimation:

COURSE CODE: SE 302

CO-1: provide understanding on E-Commerce and Technology used in E-commerce:

CO-2: provide insight into the e-commerce security environment and technology solutions relating to Encryption, security channels of communication, protecting networks and protecting servers and clients.

CO-3: makes familiar with the IT Act 2000 and Cyber Crimes.

CO-4: makes familiar with the Models of e- payments and methods of e–payments including risks involved in e-payments.

CO-5: provide understanding on On-line Business Transactions including E-commerce applications in various industries.

CO-6: provide working knowledge on Website designing.

COURSE CODE: C 408

CO-1: provide insight into cost concepts and theoretical aspects of cost accounting and preparation of cost sheet.

CO-2: provide working knowledge on accounting for materials and labour.

CO-3: familiarizes with accounting for overheads and absorption costing.

CO-4: enables to understand the workings of process costing and reconciliation of cost and financials account.

CO-5: provide understanding on Integral and non- integral systems and Reconciliation of cost and financial accounts.

COURSE CODE: C 408

CO-1: provide understanding on Algebra of matrices and solution of system of linear equations.

CO-2: enables to understand Mathematical functions and its types, Logarithmic function, Concept and rules of differentiation and concept of marginal Analysis.

CO-3: provide understanding on partial differentiation and Maxima and Minima.

CO-4: familiarizes with rates of interest, compounding and discounting rates and types of annuities.

CO-5: makes proficient in formulation of linear programming problem.

COURSE CODE: C 410

CO-1: be proficient in creating business documents using word processing tools.

CO-2: makes familiar with creating business presentations using presentation tools.

CO-3: provide knowledge on Spreadsheets and its application in Business.

CO-4: makes proficient in creating spreadsheet in different areas.

CO-5: familiarizes with the database design for accounting and business applications, SQL and Retrieval of information and DBMS Software.

COURSE CODE: G 404

CO-1: provide understanding on basic issues in economic development.

CO-2: makes familiar with Basic features of the Indian Economy at Independence.

CO-3: enables to know the economic reforms since 1991 and monetary and fiscal policy.

CO-4: provide knowledge on the growth, Development and structural changes in different phases of growth and changes in policy perspectives on the role of institutional framework after 1991.

CO-5: familiarizes with the trends and issues of Agricultural sector, Industry and Service sector and financial sector.

COURSE CODE: SEC 403

CO-1: Enables to know who is an entrepreneur and definitions and functions of an entrepreneur.

CO- 2: familiarizes with the traits of entrepreneur and distinction between an entrepreneur and a manager, Entrepreneur and enterprise.

CO-3: makes proficient with the theories of entrepreneurial origin and Theory of Invisible cost.

CO-4: Enables to know the roles of Government and NGOs in Entrepreneurship development and Relevence and Achievements in Entrepreneurship.

COURSE CODE: SEC 403 A

CO-1: provide understanding on the concept, evaluation, nature and importance of retailing and comparison between global and Indian scenario of retailing.

CO-2: Enables to know the position of retailing in the channels of distribution and distinction between retailing and wholesaling.

CO-3: Familiarizes with the types of retailing.

CO-4: Enables to know the growth and status of retailing in India and successful retailing formats in India.

COURSE CODE: DSE 501 G I

CO-1: provide understanding on the concept of Management Accounting and tools and techniques of Management Accounting.

CO-2: Familiarizes with the Cash flow Statements as per Indian Accounting Standard 7 (revised), fund flow statement.

CO-3: Enables to know the Marginal & differential costing as a tool for decision making regarding make or buy, change of product mix, Pricing, Break-even analysis, Exploring new markets and Shutdown decisions.

CO-4: makes proficient in preparation of Fixed budgets, Flexible budgets and Functional budgeting;

COURSE CODE: DSE 502 G I

CO-1: be acquainting with accounts of banking companies along with preparation of financial statements.
CO-2: familiarizes with accounting of life insurance companies and ascertainment of profit in life insurance companies.
CO-3: makes proficient in accounting of general insurance companies.
CO-4: provide understanding on accounting for investment.

COURSE CODE: DSE 501 G II

CO-1: gives knowledge on theoretical aspects of industrial relations and theories.
CO-2: makes acquaint with government policies in relation to industrial relations.
CO-3: provide insight into the management of strikes and lock outs under the Industrial Disputes Act.
CO-4: provide knowledge on industrial disputes, prevention and settlement of industrial disputes and negotiations.

COURSE CODE: DSE 502 G II

CO-1: familiarize with HRD: Concept, Growth, Position of HRD in Human Resource Management, Objectives, Scope, Need and Importance of HRD. Role of a HRD Manager
CO-2: understand HRD Structure, HRD Culture and Climate, HRD as a System, Role of Line Managers in HRD System, HRD Audit.
CO-3: acquainted with HRD Practices in India, Objective of Strategic HRD, Components and Principles of Strategic HRD.
CO-4: conceptualize the Training and Development, evaluation of Training and Development Program.

COURSE CODE: DSE 501 G III

CO-1: provide understanding on Consumer Behaviour including Consumer Behaviour as a Marketing Discipline and Consumer Involvement and Decision Making Process.

CO- 2: familiarize with the Information search process regarding Evaluation criteria and Decision Rules, Consumer Need and Motives.

CO-3: provide understanding on Socio-Cultural Factors of Consumer Behaviour.

CO-4: familiarize with Personal and Psychological Factors of Consumer Behaviour:

COURSE CODE: DSE 502 G III

CO-1: provide understanding on nature, scope and functions of Retailing and Reasons for growth of retailing including emerging trends in retailing.

CO-2: familiarize with Types and organization structure of retail stores.

CO-3: provide understanding on Logistic issues and distribution Stores location, Inventory control, warehousing and transportation planning.

CO-4: provide insight into the organized and unorganized retailing in India and challenges in retailing and global retailing trends.

COURSE CODE: SEC 501

CO-1: Enables to know about the Promotional Agencies of Entrepreneurial Development including Governmental and Non-governmental Agencies.

CO- 2: provide insight into Institutional Support for Entrepreneurship Development from MSMEDO, MSMEDI, DICC and KVIC/KVIB

CO- 3: familiarize with the Role of NEDFi, SIDBI/IDBI, IIE and Micro Finance Institutions in promoting Entrepreneurship Development.

CO-4: Enables to know the roles of Government and NGOs in Entrepreneurship development and Relevence and Achievements in Entrepreneurship.

COURSE CODE: GEC 501

CO-1: provide insight into the Demand and Supply and Enables to know the Elasticity of demand and supply and its Application.

CO-2: familiarizes with the consumer theory on ordinal Utility Theory.

CO-3: to understand the Production and cost including Concepts of Production function, Law of variable proportions, Isoquants, Return to scale, Economics and Diseconomies of scale and Costs in the short run, Costs in the long run, Profit maximization and cost minimization, Equilibrium of the firm.

CO-4: Enables to know the Market Structure of Perfect Competition, Monopoly and Imperfect Competition of Monopolistic Competition and Oligopoly:

COURSE CODE: DSE 601 I

CO-1: makes acquaint with the basics of investment and alternatives of investment, concept of risk and return and methods of analyzing of securities.

CO-2: provide insight into portfolio analysis and management and portfolio selection and construction specially Markowitz model.

CO-3: gives workable knowledge on capital asset pricing model and factor models.

CO-4: familiarizes with portfolio performance evaluation measures in relation with risk and return.

COURSE CODE: DSE 601 II

CO-1: understand the Emergence and objectives of Labour Laws, Basic of Labour Legislation in India, Usefulness of Labour Legislation in India, Principles of Labour Legislation.

CO-2: familiar with Objective, provisions and working of the Factories Act, 1948.

CO-3: understand The Trade Union Act, 1926.

CO-4: understand the payment of Wages Act, 1936; The Minimum Wages Act, 1948; The Payment of Bonus Act, 1965.

COURSE CODE: DSE 601 III

CO-1: makes acquaint with the concept of Service marketing including Difference between Services and goods marketing and Macro & Micro Environments for Service Marketing.

CO-2: Understanding Service Customers, Customer Behaviour, Customer Expectation & Perception, Service Marketing Segmentation, Targeting & Positioning.

CO-3: To familiar with expanded marketing mix, Planning of Service Offer, Pricing, Promotion and Distribution of Services and makes acquaint with the Management of people, Process and Physical Evidence Quality Issues & Quality Models-Advertising, Branding and Packaging of Services.

CO-4: Enables to know Service Marketing Applications including Marketing of Financial, Hospital, hospitality, Tourism & Educational services.

COURSE CODE: DSE 602 I

CO-1: to understand the Meaning, Significance, Types and Limitation of Financial Statements Analysis and insight into the Accounting Choices or Practices including Comparative and Common Size Statement, Value Added Statement and Economic Value added Statements

CO-2: familiarize with Profitability Ratio, Solvency Ratio, Activity Ratio, Profit and Loss Account Ratio, Balance sheet and Composite Ratios.

CO-3: makes acquaint with the Concept of Financial Reporting including Corporate Social Responsibility and Corporate Governance.

CO-4: Enables to know the financial reporting by banks, NBFCs and Insurance Companies and RBI and IRDA Guidelines for financial reporting.

COURSE CODE: DSE 602 II

CO-1: familiarize with the Concept, functions, Objectives and Structure of Trade Unionism and Recognition and Problems of Indian Trade Unions.

CO-2: to understand the Meaning, features and Growth of white collar unions in India including differences between white collar workers and blue collar workers and nature, growth and activities of Managerial Association.

CO-3: Enables to know the Aims, Objectives and Growth of Employers' Associations including Organization and Management of Employers' Association in India.

CO-4: makes acquaint with the International Labour organization and its major activities and its impact in Labour Legislation in India.

COURSE CODE: DSE 602 III

CO-1: to understand the Different types, benefits, legal and ethical aspects of advertisement.

CO-2: familiarize with the Advertising Planning, Decision Making and development of advertising Programme

CO-3: makes acquaint with the Creative aspects of Advertisement including appeals, copywriting, headlines, illustration, message, and copy types, Selection of font, text and language.

CO-4: Enables to know the roles and services of Advertising agency and selection and types of Advertising agency.