Bharati Vidyapeeth (Deemed to be University), Pune

YASHWANTRAO MOHITE COLLEGE ARTS, SCIENCE & COMMERCE

Erandwane, Pune- 411 038

Accredited with 'A+' Grade (2017) by NAAC 'A' Grade University Status by MHRD,

Govt. of India Accredited (2004) & Reaccredited (2011) with 'A' Grade by NAAC

B.Sc. (Computer Science)
Course Structure
As per NEP 2020

(To Be Implemented From Academic Year 2023-24)

BHARATI VIDYAPEETH (DEEMED to be UNIVERSITY), PUNE

Bachelor of Computer Science B.Sc.(Computer Science)
Learning Outcomes-Based Curriculum

for 3/4 years B. Sc. (Computer Science) Programme

as per guidelines of

NEP-2020

for

B. Sc. (Computer Science)-I

With effect from Academic Year
2023-2024 (NEP 2020 Policy)

Under : The Faculty of Science

BHARATI VIDYAPEETH (DEEMED to be UNIVERSITY), PUNE
Bachelor of Computer Science B.Sc. (Computer Science)
(NEP 2023 Course)
Under: Faculty of Science

The B.Sc./ B.Sc.(Computer Science) Honours Degree Course is of three/ four years duration divided into six/eight semesters. The structure of the course and syllabus of the first year will come into effect from the academic year 2023-2024.The second and third- and fourth-year syllabus will be implemented from 2024-2025 and 2025-2026, 2026-2027respectively.

1. **Aims of Bachelor of Science Program in Computer Science B.Sc.(Computer Science):**

The B.Sc. (Computer Science) program emphasizes problem solving in the context of algorithm development and software implementation and prepares students for effectively using modern computer systems in various applications. The curriculum provides required Computer Science courses such as Programming Languages, Data Structures, Computer Architecture and Organization, Algorithms, Database Systems, Operating Systems and Software Engineering; as well as elective courses in Data Mining, computer-based communication networks, distributed computing, Data Analytics, web technology, and other current topics in computer science. The main aim of this Bachelor's degree is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. The purpose of the B.Sc./ B.Sc.(Computer Science) Honours Degree are twofold: (1) to prepare the student for a position involving the design, development and implementation of computer software/hardware, and

(2) to prepare the student for entry into a program of postgraduate study in Computer Science/Engineering and related fields.

The B.Sc. B.Sc./ B.Sc.(Computer Science) Honours Degree program focuses on the concepts and techniques used in the design and development of software systems along with overall development of students in all aspects of disciplines. Students in this program with major subject as Computer Science explore the conceptual underpinnings of Computer Science, its fundamental algorithms, programming languages, operating systems and software engineering techniques but also have the flexibility to choose minor subject of their choice. In addition, students choose from a rich set of electives for such Open Elective Courses, Vocational Skill Courses(VSC), Skill Enhancement Course(SEC), Ability Enhancement Courses(AEC) Indian Knowledge System(IKS), Value Education Courses(VEC), Field Projects(FP), Community Engagement and Sevice and Co-curricular Courses(CC). A generous allotment of these courses help in the overall development of the students to become a sensible citizen of India with good employability potential.

1.1 Objectives: B.Sc./ B.Sc.(Computer Science) Honours Degree:
2. To develop problem solving abilities using a computer system
3. To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems
4. To imbibe quality software development practices
5. To create awareness about process and product standards
6. To train students in professional skills related to Software Industry
7. To prepare necessary knowledge base for research and development in Computer Science
8. To help students build-up a successful career in Computer Science

9. To train students in lifelong learning skills
10. To create well informed and cultured Indian citizen

2. Graduate Attributes:

Graduate Attributes (GA) are the qualities, skills and understandings that students should develop during their time with the HEI. These are qualities that also prepare graduates as agents of social good in future.

Graduate Attributes can be viewed as qualities in following subcategories:

1. Knowledge of the discipline
2. Creativity
3. Intellectual Rigour
4. Problem Solving and Design
5. Ethical Practices
6. Lifelong Learning
7. Communication and Social Skills

Among these attributes, categories attributes under Knowledge of the Discipline are specific to a programme of study.

- **Knowledge of Discipline of CS:**

Knowledge of a discipline is defined as command of a discipline to enable a smooth transition and contribution to professional and community settings. This Graduate Attribute describes the capability of demonstrating comprehensive and considered knowledge of a discipline. It enables students to evaluate and utilize information and apply their disciplinary knowledge and their professional skills in the workplace.

- **Creativity:**

Creativity is a skill that underpins most activities, although this may be less obvious in some disciplines. Students are required to apply imaginative and reflective thinking to their studies. Students are encouraged to look at the design or issue through differing and novel perspectives. Creativity allows the possibility of a powerful shift in outlook and enables students to be open to thinking about different concepts and ideas.

- **Intellectual Rigour:**

Intellectual Rigour is the commitment to excellence in all scholarly and intellectual activities, including critical judgement. The students are expected in having clarity in thinking. This capability involves engaging constructively and methodically when exploring ideas, theories and philosophies. It also relates to the ability to analyse and construct knowledge with depth, insight and intellectual maturity.

- **Problem Solving and Design:**

Problem solving skills empower students not only within the context of their programmes, but also in their personal and professional lives. Many employers cite good problem solving skills as a desired attribute that they would like graduates to bring to the workplace. With an ability to seek out and identify problems, effective problem solvers are able to actively engage with a situation, think creatively, to consider different perspectives to address identified challenge, to try out possible solutions and subsequently evaluate results as a way to make decisions. Through this process they can consolidate new and emergent knowledge and develop a deeper understanding of their subject discipline.

- **Ethical Practices:**

Ethical practice is a key component of professionalism and needs to be instilled in curricula across courses. When operating ethically, graduates are aware that we live in a diverse society with many competing points of view. Ethical behaviour involves tolerance and

responsibility. It includes being open-minded about cultural diversity, linguistic difference, and the complex nature of our world. It also means behaving appropriately towards colleagues and the community and being sensitive to local and global social justice issues.

- **Life-Long Learning:**

The skill of being a lifelong learner means a graduate is open, curious, willing to investigate, and consider new knowledge and ways of thinking. This flexibility of mind means they are always amenable to new ideas and actively seek out new ways of learning or understanding the world.

- **Communication and Social Skills:**

The ability to communicate clearly and to work well in a team setting is critical to sustained and successful employment. Good communication and social skills involve the ability to listen to, as well as clearly express, information back to others in a variety of ways - oral, written, and visual - using a range of technologies.

- **Self-Management:**

Graduates must have capabilities for self-organisation, self-review, personal development and life-long learning.

3. **Programme Outcomes:**

After completion of this Programme a student will have :

PO1: Commitment to excellence in all scholarly and intellectual activities, including critical judgement

PO2: Ability to think carefully, deeply and with rigour when faced with new knowledge and arguments.

PO3: Capacity to engage constructively and methodically when exploring ideas, theories and philosophies

PO4: Capabiltiy to consider other points of view and make a thoughtful argument

PO5: potential to develop creative and effective responses to intellectual, professional and social challenges

PO6: Ability to apply imaginative and reflective thinking to their studies

PO7: Commitment to sustainability and high ethical standards in social and professional practices

PO8: Open-mindness about cultural diversity, linguistic difference, and the complex nature of our world

PO9: Ability to be responsive to change, to be inquiring and reflective in practice, through information literacy and autonomous, self-managed learning

PO10: Inquisitive mind to communicate and collaborate with individuals, and within teams, in professional and community settings

PO11: Ability to communicates effectively, comprehending and writing effective reports and design documentation, summarizing information, making effective oral presentations and giving and receiving clear oral instructions

PO12: Ability to demonstrates competence in the practical art of computing by showing in design an understanding of the practical methods, and using modern design tools competently for complex real-life IT problems

PO13: experiment with the use of a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems

PO14: Ability to understand, design, and analyse precise specifications of algorithms, procedures, and interaction behaviour

PO15: Capability to apply mathematics, logic, and statistics to the design, development, and analysis of software systems

PO16: Capacity to identify and to apply relevant problem-solving methodologies

PO17: Ability to design components, systems and/or processes to meet required specifications

PO18: Ability to apply decision making methodologies to evaluate solutions for efficiency, effectiveness and sustainability

PO19: Capacity for self-reflection and a willingness to engage in self-appraisal

PO20: Openness to objective and constructive feedback from supervisors and peers

PO21: strength to negotiate difficult social situations, defuse conflict and engage positively in purposeful debate

4. Qualification Descriptor for B.Sc./ B.Sc.(Computer Science) Honours Degree :

On completion of B.Sc./ B.Sc.(Computer Science) Honours Degree, the expected learning outcomes that a student should be able to demonstrate are the following:

- Fundamental understanding of the principles of Computer Science and its connections with other disciplines
- Procedural knowledge that creates different types of professionals related to Computer Science, including research and development, teaching and industry, government and public service;
- Skills and tools in areas related to computer science and current developments in the academic field of study.
- Use knowledge, understanding and skills required for identifying problems and issues, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, and their application, analysis and evaluation using methodologies as appropriate to Computer Science for formulating solutions
- Communicate the results of studies undertaken in Computer Science accurately in a range of different contexts using the main concepts, constructs and techniques
- Meet one's own learning needs, drawing on a range of current research and development work and professional materials
- Apply Computer Science knowledge and transferable skills to new/unfamiliar contexts,
- Demonstrate subject-related and transferable skills that are relevant to industry and employment opportunities.

5. Programme Specific Outcomes for B.Sc./ B.Sc.(Computer Science) Honours Degree

   The Bachelor of Science (Computer Science) program enables students to attain, by the time of graduation:
- PROGRAM SPECIFIC OUTCOMES (POs)
- PSO1: Learn how to organize information efficiently in the forms of outlines, charts, etc. by using appropriate software

- PSO2: Develop the skills to present ideas effectively and efficiently
- PSO3: Do Academic and Professional Presentations - Designing and delivering an effective presentation and developing the various IT skills to the electronic databases.

- PSO4: Use the Systems Analysis Design paradigm to critically analyze a problem

- PSO5: Solve the problems (programming networking database and Web design) in the Information Technology environment

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- PSO6:Function effectively on teams to accomplish a common goal and demonstrate professional behavior

- PSO7: Design and implement a web page to Improve communication and business management skills, especially in providing technical support

- PSO8: Display the knowledge of appropriate theory, practices and tools for the specification, design and implementation

- PSO9: Ability to pursue higher studies of specialization and to take up technical employment

- PSO10: Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate them

6. **Rules & Regulations for B. Sc. (Computer Science) Course**

Eligibility for Admission to B.Sc./ B.Sc.(Computer Science) Honours Course:

i. A candidate who has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board or Higher Secondary Examination of its equivalent of any other statutory Board or University and has passed in English and in two Science subjects (i) Physics (ii) Mathematics shall be eligible for admission to the First year B.Sc (Computer Science) Degree course.

ii. Candidate who has passed H.S.C. examination (10+2) with English, Mathematics and any one of the following vocational subjects is also eligible for admission to the F.Y.B.Sc. (Computer Science) course.

Subject code	Subject
97	Information Technology
D9	Computer Science
C2	Electronics
J1/J2/J3	Electronics Technology

iii. Also student who has completed Diploma course in Engineering (Polytechnic) Computer Science, Electronics and Information Technology or its equivalent examination recognized by MBTE, Mumbai or its equivalent of any other statutory Board or University.

iv. With effect from Academic Year 2023-24, three years/four years Degree Program will be introduced. Thus, the Fourth year of Honours/ Honours with Research program (Level 6.0) will begin with effect from Academic Year 2026-27

v. The students can opt for dance/music/visual Arts in the sister concern institutes; School of Performing Arts, Pune and School of Visual Arts, Pune.

vi. **Admission process:**

- Admissions will be given as per the selection procedure/policies adopted by the college, in accordance with conditions laid down by Bharati Vidyapeeth University, Pune.

- Reservation and relaxation will be as per the Government rules and Bharati Vidyapeeth University, Pune.

7. **Intake Capacity:**
   Intake capacity of the students for this course at the entry level will be 80 per year.

8. **Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits**

Major Subject : Computer Science
Minor : Electronics/Mathematics

Semester I						
Level	**Course type**	**Type**	**Subject Code**	**Title of the Course**	**No. Credits**	**No. of lecture hrs.**
4.5	**Major**	Theory	MJ-CS 101	Introduction to C Programming	2	30
	Major	Theory	MJ-CS 102	Database Management Concepts	2	30
	Major	Practical	MJ-CS 103	Computer Science Practical I	2	60
	OE	Theory	OE -101	Understanding to Geomorphology-I Understanding to Climatology-I	2 2	30
	VSC	Voc.Skill Theory	VSC-101	HTML Programming	2	30
	SEC	Theory	SEC- 101	Electronic Instrumentation	2	30
	AEC	Theory	AEC-101	Communication Skills in English -I OR Bhashik Kaushalye ani Vyaktimatva vikas	2	30
	VEC	Theory	VEC-101	Digital and Technological Solutions	2	30
	IKS	Theory	IKS-101	Indian Knowledge System	2	30
	CC	Skill	CC-101	Yoga/NSS/NCC/Dance/Music/ Cultural activities	2	60 hrs*
				Total Credits	**22**	

* The students have to be spent minimum 60 hours in all for the given activity in each Semester

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits

Major Subject : Computer Science
Minor : Electronics/Mathematics

				Semester-II		
Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
4.5	**Major**	Theory	MJ-CS 201	Advanced C Programming	**2**	**30**
	Major	Theory	MJ-CS 202	Relational Database Management Systems	**2**	**30**
	Major	Practical	MJ-CS 203	Computer Science Practical II	**2**	**60**
	Minor	Theory	MN-EL211/MT211	Fundamentals of Logic Design/ Discrete Mathematics	**2**	**30**
	OE	Theory	OE-201	Understanding to Geomorphology-II Understanding to Climatology-II	**2** **2**	**30**
	VSC	Theory	VSC-201	Web Designing using HTML	**2**	**30**
	SEC	Theory	SEC-201	Introduction to the Internet of Things and Embedded Systems	**2**	**30**
	AEC	Theory	AEC- 201	Communication Skills in English -II OR Sanyapan kaushalye ani karyalein lehkan	**2**	**30**
	VEC	Theory	VEC- 201	Environmental Studies	**2**	**30**
	CC	Skill	CC- 201	Yoga/NSS/NCC/Dance/Music/ Cultural activities	**2**	**60 hrs***
				Total Credits	**22**	
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor						

* The students have to be spent minimum 60 hours in all for the given activity in each Semester

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits

Major Subject : Computer Science
Minor : Electronics/Mathematics

				Semester III		
Level	**Course type**	**Type**	**Subject Code**	**Title of the Course**	**No. Credits**	**No. of lecture hrs.**
	Major	Theory	MJ-CS 301	Object Oriented programming	2	30
	Major	Theory	MJ-CS 302	Data Warehousing and Data Mining	2	30
	Major	Theory	MJ-CS 303	Functional Programming with C #	2	30
	Major	Practical	MJ-CS 304	Computer Science Practical III	2	60
	Minor	Theory	MN-EL311/MT311	Principles of Analog Electronics/ Operation Research	2	30
5.0	**Minor**	Practical	MN-El 322/MT322	Electronics Practical –I/ Mathematics Practical-I	2	60
	OE	Theory	OE- 301	Human Geography	2	30
	VSC	Voc.Skill	VSC- 301	Python Programming/ Optimization Techniques	2	30
	AEC	Theory	AEC- 301	Business Communication **OR** Prasar Madhyame ani Marathi bhasha	2	30
	VEC	Theory	VEC- 302	Internet of Things	2	30
	CC/FP	Skill	CC- 301	Yoga/NSS/NCC/Dance/Music/Cultural activities FP	2	60 hrs*
				Total Credits	**22**	

* The students have to be spent minimum 60 hours in all for the given activity in each Semester

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits

Major Subject : Computer Science
Minor : Electronics/Mathematics

				Semester IV		
Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
	Major	Theory	MJ-CS 401	Data Structures and Algorithms	2	30
	Major	Theory	MJ-CS 402	Data Mining Techniques	2	30
	Major	Theory	MJ-CS 403	Programming in JAVA	2	30
	Major	Practical	MJ-CS 404	Computer Science Practical IV	2	60
	Minor	Theory	MN-El 411/MT411	Computer Organization and Microprocessors/ Applied Algebra	2	30
	Minor	Practical	MN-El 422/MT422	Electronics Practical –II/ Mathematics Practical-II	2	60
5.0	**OE**	Theory	OE- 401	Population Geography	2	30
	AEC	Theory	AEC- 401	English for Digital World OR Marathi Bhasha: Upyojan ani Sarjan	2	30
	SEC	Practical	SEC- 401	Advanced Python programming	2	30
	CC	Skill	CC- 401	Yoga/NSS/NCC/Dance/Music/FP	2	60 hrs*
	CEP	Outreach	CEP 401	Field survey and data analysis for particular sector of services	2	60 hrs*
				Total Credits	**22**	
Exit option; Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor						

* The students have to be spent minimum 60 hours in all for the given activity in each Semester

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits

Major Subject : Computer Science
Minor : Electronics/Mathematics

Level	Course type	Type	Subject Code	Semester V Title of the Course	No. Credits	No. of lecture hrs.
5.5	**Major**	Theory	MJ-CS 501	Open Source Technology	**2**	**30**
	Major	Theory	MJ-CS 502	System Programming	**2**	**30**
	Major	Theory	MJ-CS 503	Computer Networks	**2**	**30**
	Major	Practical	MJ-CS 504	Computer Science Practical V	**2**	**60**
	Major	Practical	MJ-CS 505	Computer Science Practical VI	**2**	**60**
	DSE	Theory	MJ- EL CS 506	**Elective (Any One theory of the following)** MJ- EL CS 506 A: Theoretical Computer Science MJ- EL CS 506 B:Study of Google Tools MJ- EL CS 506 C:Advanced Excel	**2**	**30**
	DSE	Practical	MJ- EL CS 507	MJ- EL CS 507: Computer Science Practical VII	**2**	**60**
	Minor	Theory	MN-El 501/MT501	Communication Principles/ Introduction to Graph Theory	**2**	**30**
	Minor	Practical	MN-El 502/MT502	Electronics Practical-III/ Mathematics Practical-III	**2**	**60**
	VSC	Voc.Skill	VSC - 501	Soft Computing using Data Mining	**2**	**30**
	FP/CEP	Skill	FP/CEP-501	Field Project	**2**	**60 hrs***
				Total Credits	**22**	

* The students have to be spent minimum 60 hours in all for the given activity in each Semester

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits   Major Subject : Computer Science

Minor : Electronics/Mathematics

				Semester VI		
Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
5.5	**Major**	Theory	MJ-CS 601	Operating System	2	30
	Major	Theory	MJ-CS 602	UML	2	30
	Major	Theory	MJ-CS 603	Advanced JAVA	2	30
	Major	Practical	MJ-CS 604	Computer Science Practical VIII	2	60
	Major	Practical	MJ-CS 605	Computer Science Practical VIX	2	60
	DSE	Theory	MJ- EL CS 606	**Elective (Any One theory of the following)** MJ- EL CS 606 A:Compiler Construction MJ- EL CS 606 B: Software Engineering MJ- EL CS 606 C: Mongo DB	2	30
	DSE	Practical	MJ- EL CS 607	MJ- EL CS 607: Computer Science Practical X	2	60
	Minor	Theory	MN-El 51/MT51	8051 Microcontroller and its interfacing/ Computer Oriented Numerical Methods	2	30
	Minor	Practical	MN-El 52/MT52	Electronics Practical-IV/ Mathematics Practical-IV	2	60
	OJT/F.P.	Outreach	OJT-51 / F.P.	On Job Training / Field Project	4	120 hrs*
				Total Credits	22	
Exit option: Award of UG Degree in Major with 120-132 credits OR Continue with Major and Minor						

* The students have to be spent minimum 120 hours in all for the given activity in each Semester

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits

Major Subject : Computer Science
For B.Sc.(Computer Science) Honours Degree Semester VII and Semester VIII

Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
				Semester -VII		
6.0	**Major**	Theory	MJ-CS 701	Advanced Database Management System	4	60
	Major	Theory	MJ-CS 702	Software Project Management	4	60
	Major	Theory	MJ-CS 703	Digital Image processing	4	60
	Major	Practical	MJ-CS 704	CS 704: Computer Science Practical XI	2	60
	Elective	Theory	MJ- EL CS 705	**Elective (Any One theory of the following)** MJ- EL CS 705 A: Algorithm Design Pattern MJ- EL CS 705 B: Paradigms of Programming Language	2	30
	Elective	Practical	MJ- EL CS 706	CS 706: Computer Science Practical XII	2	60
	RM	Theory	RM-71	Research Methodology	4	60
				Total Credits	22	

Course Structure of B.Sc./ B.Sc.(Computer Science) Honours Degree Programme and scheme of credits

Major Subject : Computer Science

Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
				Semester -VIII		
6.0	**Major**	Theory	MJ-CS 801	Big Data Analytics	4	60
	Major	Theory	MJ-CS 802	Cloud Computing	4	60
	Major	Theory	MJ-CS 803	Block Chain Technology	4	60
	Major	Practical	MJ-CS 804	Computer Science Practical XIII	2	60
	Elective	Theory Theory Theory	MJ- EL CS 805	**Elective (Any One theory of the following)** MJ- EL CS 805A: Software Testing MJ- EL CS 805B: Soft Computing	2	30
	Elective	Practical	MJ- EL CS 806	MJ- EL CS 806: Computer Science Practical XIV	2	60
	OJT	Outreach	OJT-81	On Job Training-81	4	120 hrs*
				Total Credits	22	

* **The students have to be spent minimum 120 hours in all for the given activity in each Semester**

For B.Sc.(Computer Science) Honours with Research Degree
Semester VII and Semester VIII

Semester VII						
Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
6.0	**Major**	Theory	MJ-CS 701	Advanced Database Management System	**4**	**60**
	Major	Theory	MJ-CS 702	Digital Image processing	**4**	**60**
	Major	Practical	MJ-CS 703	CS 704: Computer Science Practical XI	**2**	**60**
	Elective	Theory	MJ- EL CS 704	**Elective (Any One theory of the following)** MJ- EL CS 704 A: Algorithm Design Pattern MJ- EL CS 704 B: Paradigms of Programming Language	**2**	**30**
	Elective	Practical	MJ- EL CS 705	CS 705: Computer Science Practical XII	**2**	**60**
	RM	Theory	RM-71	Research Methodology	**4**	**60**
	RP		RP-72	Research Project	**4**	**-**
				Total Credits	**22**	

Semester VIII						
Level	Course type	Type	Subject Code	Title of the Course	No. Credits	No. of lecture hrs.
6.0	**Major**	Theory	MJ-CS 801	Big Data Analytics	**4**	**60**
	Major	Theory	MJ-CS 802	Block Chain Technology	**4**	**60**
	Major	Practical	MJ-CS 803	Computer Science Practical XIII	**2**	**60**
	Elective	Theory	MJ- EL CS 804	**Elective (Any One theory of the following)** MJ- EL CS 804A: Software Testing MJ- EL CS 804B: Soft Computing	**2**	**30**
	Elective	Practical	MJ- EL CS 805	MJ- EL CS 805: Computer Science Practical XIV	**2**	**60**
	RP		RP-81	Research Project	**8**	**-**
				Total Credits	**22**	

(If a student wants to go for B.Sc.(Computer Science) Honours with Research , he/she has to complete Research Project instead of On Job Training for 4 Credits)

List of Minor subject: Electronics

Year/ Level	Sem	Subject Code	Theory/ Practical	Course Title	No. Credits	No. of Lectures	Total Credits
4.5	II	MN-El 201	Theory	Fundamentals of Logic Design	2	30	2
5	III	MN-El 301	Theory	Principles of Analog Electronics	2	30	4
		MN-El 302	Practical	Electronics Practical -I	2	60	
	IV	MN-El 401	Theory	Computer Organization and Microprocessors	2	30	4
		MN-El 402	Practical	Electronics Practical -II	2	60	
5.5	V	MN-El 501	Theory	Communication Principles	2	30	4
		MN-El 502	Practical	Electronics Practical-III	2	60	
	VI	MN-El 601	Theory	8051 Microcontroller and its interfacing	2	30	4
		MN-El 602	Practical	Electronics Practical-IV	2	60	

List of Minor subject: Mathematics

Year/ Level	Sem	Subject Code	Theory/ Practical	Course Title	No. Credits	No. of Lectures	Total Credits
4.5	II	MN-MT 201	Theory	Discrete Mathematics	2	30	2
5	III	MN- MT 301	Theory	Optimization Techniques	2	30	4
		MN- MT 302	Practical	Mathematics Practical -I	2	60	
	IV	MN- MT 401	Theory	Applied Algebra	2	30	4
		MN- MT 402	Practical	Mathematics Practical -II	2	60	
5.5	V	MN- MT 501	Theory	Introduction to Graph Theory	2	30	4
		MN- MT 502	Practical	Mathematics Practical -III	2	60	
	VI	MN-El 601	Theory	Computer Oriented Numerical Methods	2	30	4
		MN-El 602	Practical	Mathematics Practical -IV	2	60	

Abbreviations:

   (a) Major (Core)
   (b) Elective Major
   (c) Minor
   (d) Vocational Skill Courses(VSC)
   (e) Generic/ Open Elective Courses (OE)
   (f) Vocational and Skill Enhancement Courses (VSEC):Skill Enhancement Courses (SEC)
   (g) Ability Enhancement Courses (AEC)
   (h) Indian Knowledge System (IKS)
   (i) Value Education Courses (VEC)
   (j) Field Projects/ Internship/ Apprenticeship/ Community Engagement and Service corresponding to the Major (Core) Subject,
   (k) Co-curricular Courses (CC)
   (l) Research Project

9. MEDIUM OF INSTRUCTION:

The medium of instruction and examination shall be English.

10. SCHEME OF EXAMINATION:

The Assessment of Regular students of B.Sc./ B.Sc.(Computer Science) Honours Degree course in the academic session 2023-24 and thereafter shall be based on

   (a) University Examinations (UE),
   (b) Internal Assessment (IA),
   (c) Learning outcomes Based Curriculum Framework including Multidisciplinary learning and provision for multimodal curriculum transaction (online/offline/blended mode) and skill based experimental learning among others
   (d) Semester Grade Point Average (SGPA) and Cumulative Grade Point Average system (CGPA)

For each Major, Minor, OE, AEC, SEC, VSC, VEC, CC and elective papers the evaluation will be as follows:

Internal assessment   : 40%
University Assessment   : 60%

There will be Internal Assessment of 20 marks and the University Assessment of 30 marks/1.5 hours duration at the end of each semester. The 02 credit will be given to a student who secures at least 40% of marks allotted to each paper.02 credits will be awarded to a student who secures at least 40% of marks allotted to each subject. A student who does not pass the examination in any subject or subjects in one semester will be permitted to reappear in such failed subject or subjects along with the papers of following semesters.

The Internal Assessment (IA) for each paper will be of 20 marks. The Internal Assessment may be in the forms as follows:

   a) Home Assignment/Tutorial/Test/Presentation/seminar/oral   10 Marks
   b) Mid Semester Examination   10 Marks

Each practical examination for laboratory course is of 50 marks and two-hour duration. The FP and OJT included in the Semesters V and VI will be evaluated for 50 marks for the allotted 2 credits for which the students should submit a detailed report. This report should be

evaluated by a panel consisting of one internal and one external examiner .For all i.e laboratory course, FP and OJT there will be internal assessment of 20 marks and the university examination of 30 marks.

A candidate shall be permitted to proceed further from the first semester upto Fourth Semester Irrespective of his/her failure in any of the semester Examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (Subsequent) semester subject. However he/she should have cleared all the papers at F.Y.B.Sc. (Comp. Sc.) I and II when He/She gets admission to T.Y.B.Sc. (Comp. Sc.) Sem V.

All the students admitted to the Post graduation programme in M.Sc.(Computer Science) should register themselves on the Academic Bank of Credits (ABC) portal and create their ABC ID. Students also need to share their ABC ID to the college examination cell at the beginning of the academic year. Without this a student will not be able to be a part of National Academic Repository.

11. GRACING:
The gracing shall be done as per existing rules of the University.

12. VERIFICATION AND REVALUATION:
There is provision for verification and revaluation of the result. A student can apply for the verification and revaluation of the result within the two weeks from the declaration of the results with the prescribed fee. The verification and revaluation shall be done as per the existing rules of the University.

13. STANDARD OF PASSING:
For all courses, both UE and IA constitute separate heads of passing. In order to pass in such courses and to earn the assigned credits, the learner must obtain a minimum grade point of 5.0 (40% marks) at UE and also a minimum grade point of 5.0 (40% marks) at IA.

If a student fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for the course is at least 6.0 (50% in aggregate). The GPA for a course will be calculated only if the learner passes at the UE.

A student who fails at UE in a course has to reappear only at UE as a backlog candidate and clear the head of passing. Similarly, a student who fails in a course at IA has to reappear only at IA as a backlog candidate and clear the head of passing.

The 10-point scale Grades and Grade Points according to the following table.

Range of Marks (Out of 100)	Grade	Grade Point
$80 \leq$ Marks ≤ 100	O	10
$70 \leq$ Marks < 80	A+	9
$60 \leq$ Marks < 70	A	8
$55 \leq$ Marks < 60	B+	7
$50 \leq$ Marks < 55	B	6
$40 \leq$ Marks < 50	C	5
Marks < 40	D	0

The performances at UE and IA will be combined to obtain the Grade Point Average (GPA) for the course. The weights for performance at UE and IA shall respectively be 60% and 40%.

GPA is calculated by adding the UE marks out of 60 and IA marks out of 40. The total marks out of 100 are converted to grade point, which will be the GPA

Formula to calculate Grade Points (GP)

Suppose that '*Max*' is the maximum marks assigned for an examination or evaluation based on which GP will be computed. In order to determine the GP, Set $x = Max / 10$ (since we have adapted 10-point system). Then GP is calculated by the formulas shown as below.

Range of Marks at the evaluation	Formula for the Grade Point
$8x \leq \text{Marks} \leq 10x$	10
$5.5x \leq \text{Marks} < 8x$	Truncate (Marks/x) +2
$4x \leq \text{Marks} < 5.5x$	Truncate (Marks/x) +1

Two kinds of performance indicators, namely, the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA) shall be computed at the end of each term. The SGPA measures the cumulative performance of a learner in all the courses in a particular semester, while the CGPA measures the cumulative performance in all courses since his/her enrolment. The CGPA of learner when he/she completes the programme is the final result of the learner.

The SGPA is calculated by the formula $\text{SGPA} = \frac{\sum C_k \times GP_k}{\sum C_k}$, where C_k is the credit-value assigned to a course and GP_k is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study during the semester, including those in which he/she might have failed or those for which he/ she remained absent. **The SGPA shall be calculated up to two decimal place accuracy.**

The CGPA is calculated by the formula $\text{CGPA} = \frac{\sum C_k \times GP_k}{\sum C_k}$, where C_k is the credit-value assigned to a course and GP_k is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study from the time of his/her enrolment and also the during the semester for which CGPA is calculated, including those in which he/she might have failed or those for which he/she remained absent. **The CGPA shall be calculated up to two decimal place accuracy.**

The Formula to compute equivalent percentage marks for specified CGPA:

% Marks (CGPA) =	$10 \times \text{CGPA} - 10$	if $5.00 \leq \text{CGPA} \leq 6.00$
	$5 \times \text{CGPA} + 20$	if $6.00 \leq \text{CGPA} \leq 8.00$
	$10 \times \text{CGPA} - 20$	if $8.00 \leq \text{CGPA} \leq 9.00$
	$20 \times \text{CGPA} - 110$	if $9.00 \leq \text{CGPA} \leq 9.50$
	$40 \times \text{CGPA} - 300$	if $9.50 \leq \text{CGPA} \leq 10.00$

Award of Honours:

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of honours are given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
$9.50 \leq CGPA \leq 10.00$	O	Outstanding	$80 \leq Marks \leq 100$
$9.00 \leq CGPA \leq 9.49$	A+	Excellent	$70 \leq Marks < 80$
$8.00 \leq CGPA \leq 8.99$	A	Very Good	$60 \leq Marks < 70$
$7.00 \leq CGPA \leq 7.99$	B+	Good	$55 \leq Marks < 60$
$6.00 \leq CGPA \leq 6.99$	B	Average	$50 \leq Marks < 55$
$5.00 \leq CGPA \leq 5.99$	C	Satisfactory	$40 \leq Marks < 50$
CGPA Below 5.00	F	Fail	Marks Below 40

14. Format of the transcript:

The student will be given a transcript indicating his/her performance at the end of every semester examination. The transcript shall be given as per the following table along with other necessary details:

Course No.	Course Name	No. of Credits	University Examination		Internal Assessment		Grade Point Average	Result
			Grade	Grade Point	Grade	Grade Point		
1								
2								
3								
4								
5								
Total Cumulative Credits Completed		SGPA		CGPA		Equivalent Marks (%)		

Note: GPA is calculated by adding the UE marks out of 60 and IA marks out of 40. The total marks out of 100 are converted to Grade Point, which will be the GPA.

*   *   *   *   *

Question Paper Pattern
NEP 2023-24

Q 1. Answer ANY ONE of the following Question. (06 M)
a)
b)

Q 2. Answer ANY ONE of the following Question. (06 M)
a)
b)

Q 3. Answer ANY TWO of the following Question. (06 M)
a)
b)
c)

Q 4. Answer ANY TWO of the following Question. (06 M)
a)
b)
c)

Q 5. Answer ANY THREE of the following Question. (06 M)
a)
b)
c)
d)

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-I
(NEP-2023 COURSE)
MJ-CS 101 : Introduction to C Programming

Course Objectives:
1. To introduce the foundations of computing, programming and problem- solving using computers.
2. To develop the ability to analyze a problem and devise an algorithm to solve it.
 3. To develop the basic concepts and terminology of programming in general.
 4. To implement algorithms in the 'C' language.
5. To test, debug and execute programs.

Course Outcomes (COs) : On Completion of the course, a student will be able to:

		Bloom's Taxonomy Level
CO1	Understand the basic concepts of programming	1
CO2	Explore algorithmic approaches to problem solving	2
CO3	Applying the syntax for logic development	3,4
CO4	Writing/constructing simple programs	6
CO5	Analyzing the source code	5

 Lectures: 30   **(Credits-2)**
Course contents
Unit I: Problem solving and 'C' programming   **(8L)**
1.1 Problem solving using Computers
1.2 Programming Languages as tools, types of languages
1.3 Algorithms-definition, characteristics, examples, advantages and limitations
1.4 Flowcharts - definition, notations, examples, advantages and limitations, Comparison with algorithms
1.5 Structure and example of first 'C' program
1.6 Compilation process (compilers, interpreters)
 1.7 Character set, Keywords, Identifiers
1.8 Variables, Constants (character, integer, float, string, escape sequences, enumeration constant)
1.9 Data Types (Built-in and user defined data types)
1.10 Operators, Expressions, Types of operators
1.11 Arithmetic operators, Increment Decrement operators, Relational and logical operators, Bitwise operators, Assignment operators, Comma operator, size of operator, conditional operator, Operator precedence and Order of evaluation
1.12 Formatted input and output, format specifiers
Unit II: Control Structures   **(7L)**
2.1 Decision making structures:- if ,if-else, else-if ladder, switch
2.2 Loop control structures - while ,do while, for
2.3 Use of break and continue
2.4 Nested control structures
2.5 Unconditional branching (goto statement)
Unit III : Functions   **(07L)**

3.1 Function definition, Types of functions (Standard library and User defined functions)
3.2 Function parameters/arguments (Actual, Formal)
3.3 Parameter passing method (by value), return statement
3.4 Recursive functions
3.5 Scope of variables and Storage classes

Unit IV : Arrays   **(08L)**
4.1 Concept of array, advantages, disadvantages
4.2 Types of Arrays – One, Two dimensional array
4.3 Array Operations - declaration, initialization, accessing array elements
4.4 Memory representation of two-dimensional array (row major and column major)
4.5 Passing arrays to function
4.6 Array applications - Linear search, sorting an array (bubble sort)

Reference Books:
1. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
2. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill
3. Programming in ANSI C, Ram Kumar and Rakesh Agrawal
4. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-I
(NEP-2023 COURSE)

MJ-CS 103 Database Management Concepts

Course Objectives:
1. To understand the fundamental concepts of database
2. To understand user requirements and frame it in data model.
3. To understand creations, manipulation and querying of data in databases.

Course Outcomes (COs) : On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Identify user requirements and frame it in data model	1
CO2	understand the fundamental concepts of database	2
CO3	Apply syntax and rules of post grey SQL for designing database	3
CO4	Analyze data by performing various data manipulation operations	4
CO5	Data evaluation and summary operations performance	5

Total credits:02   **Total lectures: 30**

Course Content

Unit I: Introduction to DBMS   **(10L)**

File structure, record structure, logical and physical files, Definition of DBMS, characteristics of DBMS, File processing system Vs DBMS, Levels of abstraction & data independence, Structure of DBMS, Advantages of DBMS,DBMS users, DBA.

Unit II: Conceptual Design with ER Model   **(10L)**
Over view of DB design process, Conceptual Design using ER data model (entities, attributes, entity sets ,relations, relationship sets), key Constraints ,Keys Concept with Examples: Primary Key, foreign keys, Candidate Keys and Super Keys, Specialization, Aggregation, Generalization
Examples of E-R Model, Structure of Relational Databases (concepts of a table) DBMS Versus RDBMS

Unit III: Introduction to postgresql
        (10L)
Introduction to query languages, DDL Commands, DML Commands, basic queries based on DDL and DML commands, operators, aggregate functions, nested Sub queries, joins and their types.

Reference Books:
1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S.Sudarshan,Tata McGraw-Hill Education
2. Database Management Systems, RaghuRamakrishnan, Mcgraw-hill higherEducation
3. File organization and fundamentals of databases , Nirali publication by Kavita Khobragade
4. RDBMS (Relational database management system) Vision publication by Mahesh Pawar

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-I
(NEP-2023 COURSE)

MJ –CS 103   Computer Science Practical – I
On completion of the course, the students will be able to:

		Bloom's Taxonomy Level
CO1	Define algorithms and flowcharts for given problems in C programming	1
CO2	Understand the use of simple data types, operators and control structures in C programming	2
CO3	Apply various standard library functions in C programming	3
CO4	Divide the programs into separate modules by writing user defined functions	4,5
CO5	Illustrate algorithms and flowcharts for given problems in C programming	6
CO1	Understand database design and inserting data.	2
CO2	Apply queries by using different commands .	3

Sr. No.   Title of Experiment /Practical

1. Write C program to make use of datatypes, operators ,I/O statements
2. Write C program to implement various decision making statements
3. Write a C program to make use of Standard library functions
4. Write a C program to implement 1-D and multi-D array
5. Write a C program to implement user defined functions
6. Write queries based on create ,alter, drop commands
7. Write queries based on select, insert, update, delete commands
8. Write queries using order by and having clause
9. Write queries using operators
10. Write queries using aggregate functions
11. Write queries to create table and apply key constraints

OE-11: Understanding to Geomorphology -I

Course Objectives:

1) Introduce the student the basic concepts in Physical Geography

2) To acquaint the student with the utility and application of Physical Geography

3) The student learns about the knowledge of Geomorphology

4) To Study the theories and concept in geomorphology.

Course Outcomes (COs): On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Give explanation of relevant terms and concept of geography including definitions	1
CO2	Make aware the student about the background knowledge of Geography.	2
CO3	Familiarize the student with some geomorphological concept and process takes place on the earth surface and within the earth crust.	3
CO4	Give better explanation about relevant principles, theories and models in geography.	4
CO5	Show clear knowledge relating to man and environmental process and factors.	5

Total credits:02   **Total lectures: 30**

Course Content

Unit I. Introduction to Geomorphology   **(15L)**

Introduction to geography: physical and human geography, Branches of Physical Geography,

Meaning and Definition of Geomorphology, Nature and Scope of Geomorphology

Importance of Geomorphology

Unit II. The Earth and its interior   **(15L)**

Sources to the study on the Earth's interior, Composition and Structure of the Earth,

Wegener's Continental Drift Theory, Criticism of the Wegener theory

REFERENCE BOOKS:

1) Physical Geography Doiphode H K KSagar Publication Topic 1-6

2) Morphology and Landscape-H. Robinson

3) The Face of the Earth - Penguins 1980- Dury G.H.

4) Elemetns of Geomprphology – Oxford University Press – Calacutta 2001- Kale V. & Gupta A.

5) Geomorphology - PrayagPustakalaya, Allahabad, 1998- Singh S

OE-11: **Understanding to** Climatology-I

Course Objectives:
1. To make the students familiar with new terms and concept of climatology.
2. To define the field of climatology and components of the climate system
3. To introduce various dimensions of climatology like structure and composition.

Course Outcomes (COs): On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Student will help better understand the atmospheric condition that causes weather patterns and temperature changes over time.	1
CO2	Give explanation of relevant terms and concept of Weather and Climatology	2
CO3	Understand the difference between weather & climate and aims, nature, scope of climatology.	3
CO4	Make aware the student about the Insolation and Heat Budget of the Earth	4
CO5	Familiarize the student with some geomorphological concept and process takes place on the earth surface and within the earth crust.	5
CO6	Give better explanation about relevant Factors and Distribution of Temperature.	6
CO7	Show clear knowledge relating to man and climatic process and factors.	7

Total credits:02   **Total lectures: 30**

Course Content

Unit I. **Composition and Structure of the Atmosphere**   **(15L)**

Introduction to Climatology, Difference between weather and climate Composition of

Atmosphere, Structure of atmosphere

Unit II. Insulation and Temperature   **(15L)**

Heat budget of the earth, Horizontal distribution of temperature, Inversion of temperature

REFERENCE BOOKS:

1. General Climatology   - H. J. Critchfield
2. Atmosphere, Wather& Climate – Routledge 1998 – Barry R.G.& Mather J.R.
3. Climatology-McGraw   - Hill, New York 1974 – Mather J.R.
4. Foundation of Climatology – Surjeet Publications, Delhi 1982 Stringer E.T.

VSC-11 HTML Programming

Course Objectives:
1. To learn basic HTML tags.
2. To design static Webpage.
3. To define styles for web pages using CSS.
4. To create a dynamic and interactive web page using Javascript

Course Outcomes (COs) : On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Understand Internet related terms	2
CO2	Build simple static Web application.	5
CO3	Define different styles for HTML tags.	1
CO4	Understand form design which helps to develop interactive webpage.	2
CO5	Design a page using basic HTML tags	5

Total credits:02   **Total lectures: 30**

Course Contents

Unit I: Introduction to Internet   **(6L)**
Basics of internet , Http & other protocols, Client/Server Concepts., Internet tools, Internet architecture, Internet security, DNS Domain Name Representation

Unit II : Introduction to HTML   **(8L)**
HTML features , HTML Structure , HTML basic Tags , Commenting Codes, Formatting and Fonts , Anchors, Hyperlinks, Backgrounds , HTML Lists, Tables, Frames , Image, video

Unit III : Form   **(8L)**
Creating Forms, The <FORM>tag, Input fields,Text Area, Password, Button, Submit, Reset, Radio, Checkbox, Select, Option

Unit IV: Introduction to CSS   **(8L)**
Need for CSS , Introduction to CSS, Basic Syntax and structure, Inline styles, Embedding Style sheets , Linking External Style, Background Styles , Manipulating Text ,Margins and Padding, Positioning using CSS

Reference Books :
1. HTML 4 Unleashed (Second Edition) : Techmedia
2. The Complete Reference HTML : Tata McGRAW-HILL 3rd Edition
3. Begining Web Programming with HTML XML and CSS :JonDuckett

SEC-11 Electronic Instrumentation

Course Objectives:
 1. To get acquainted with the different electronic components associated with computers
2. To understand the working of multimeter, Signal Generator and CRO
3. To measure voltage, current and frequency
3. To learn the operation skills of biomedical instruments

Course Outcomes (COs) : On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	identify various facilities required to set up a basic Instrumentation Laboratory	1
CO2	understand the Principle and operation of different display devices used in the display systems and different transducers	2
CO3	demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience	3
CO4	compare critically knowledge of various Electrical Instruments used in the Computer Laboratory	4
CO5	Comprehend the applications of various biomedical instruments in daily life like B.P. meter, ECG, Pulse oxymeter etc. and know the handling procedures with safety and security	5

Total credits:02   **Total lectures: 30**

Course Content
Unit –I Rectifiers and filters   **(9L)**
 Rectifiers– half wave, full-wave and bridge rectifiers- efficiency- ripple factor, regulation – harmonic components in rectified output – types of filters- choke input (inductor) filter and shunt capacitor filter- L section and π- section filters. Power supplies: block diagram of regulated power supply – a simple regulated power supply (circuit and working) – principle and working of switch mode power supply (SMPS)

UNIT-II Introduction To Instruments   **(4L)**
Types of electronic Instruments - Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter. Block Diagram of Function Generator and its working.

UNIT-III Input/ Output devices   **(8L)**
Cathode Ray Oscilloscope-Introduction, Block diagram of basic CRO, Cathode ray tube, Screen for CRT, Use of CRO for the measurement of voltage (AC and DC), frequency, phase difference, Different types of oscilloscopes and its uses. Input devices: wired /wireless Keyboard, Mouse, Scanner, Light pen, Output devices: Monitor (CRT, LCD/ LED Panel,) Printer: Dot Matrix, Inkjet, LASER and Sound devices.

UNIT-IV Display Instruments (4L)

Introduction to Display devices, Seven Segment Displays, LED Displays, Construction and operation (Display of numbers),Types of SSDs (Common Anode & Common Cathode type), Limitations of SSDs, Liquid Crystal Displays, Applications of LCD modules.

UNIT-V Biomedical Instruments (5L)

Basic operating principles and uses of (a) Clinical thermometer (b) Stethoscope (c) Sphygmomanometer (d) Pulse oxymeter (e) Glucometer

Reference Books:
1. Electronic Instrumentation by H.S.Kalsi , TMH Publishers
2. Electronic Instrument Hand Book by Clyde F. Coombs , McGraw Hill
3. Introduction to Biomedical Instrumentation byMandeep Singh, PHI Learning.
4. Biomedical Instrumentation and Measurements by Leslie Cromwell ,Prentice Hall India.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick, A.B., PHI Learning, New Delhi
8. Computer Fundamentals, P. K. Sinha
9. Upgrading and Repairing of PCs, Scott Muller 3. IBM PC and Clones, B. Govindrajalu
10. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal
11. Electronic Devices and Circuits – G.K. Mithal.
12. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-I
(NEP-2023 COURSE)
AEC-11 Communication Skills in English – I

Lectures: 30
Credits: 02

Expected Course Outcomes:

After completing the course, a learner should be able to:

 CO 1: understand the concept of communication,

 CO 2: comprehend the spoken and written language,

 CO 3: speak publically and converse effectively,

 CO 4: write various applications correctly and successfully communicate through e-mail.

Course Content:

Unit 1: Introduction to Communication Skills
- English as an International Language
- Formal and Informal Communication in Spoken English
- Effective Writing for Communication

Unit 2: Developing Comprehension Skills in English
- Reading Skills
  - Skimming and Scanning
  - Language Structure
  - Note Making
  - Summary Writing
  - Guessing Meanings of Words
  - Drawing Inferences
- Listening Skills
  - Listening Comprehension Exercises

Unit 3: Speaking Skills in English
- Public Speaking in English
- Conversation Skills
- Speaking at an Event

Unit 4: Formal Writing Skills in English
- Formal Letters
  - Job Applications with Biodata
  - Right to Information Application
  - Applications for Duplicate Documents
- Electronic Mail (e-mail)

Prescribed Textbook: Labade, Sachin et. al. (2021) *Communication Skills in English*.
Hyderabad: Orient Blackswan

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AEC-11   भाषिक कौशल्ये आणि व्यक्तिमत्व विकास

तासिका - ३०
श्रेयांक - २

अध्ययन निष्पत्ती :

१. मराठीच्या विद्यार्थ्यांना विविध क्षेत्रातील भाषिक कौशल्यांची ओळख होईल.

२. व्यक्तिमत्व विकासात इतर घटकांबरोबरच भाषेचेही महत्व अधोरेखित होईल.

घटक - १ व्यक्तिमत्व विकास आणि भाषा   तासिका - १५ श्रेयांक - १

- व्यक्तिमत्व संकल्पना
- व्यक्तिमत्व विकासासाठी आवश्यक असणारे घटक
- व्यक्तिमत्व विकासात भाषेचे स्थान

घटक -२ भाषिक कौशल्ये   तासिका - १५ श्रेयांक -१

- श्रवण कौशल्य
- संभाषण कौशल्य व भाषण कौशल्ये
- वाचन कौशल्य
- लेखन कौशल्य

संदर्भसूची :-

१. उपयोजित मराठी : संपा. डॉ. केतकी मोडक, प्रा. सुजाता शेणई, संतोष शेणई, पद्मगंधा

   प्रकाशन, पुणे.

२. व्यावहारिक मराठी : डॉ.ल.रा. नसिराबादकर, फडके प्रकाशन, कोल्हापूर.

३. शासन व्यवहारात मराठी : भाषा संचालनालय, महाराष्ट्र राज्य, मुंबई.

४. मराठी भाषिक कौशल्य विकास : संपा. पृथ्वीराज तौर, अथर्व पब्लिकेशन्स, जळगाव.

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F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-I
(NEP-2023 COURSE)

VEC-11 : Digital and Technological Solutions

Course Objectives:
• To gain familiarity with digital paradigms
• To sensitize about role & significance of digital technology
 • To provide know how of communications & networks
• To bring awareness about the e-governance and Digital India initiatives
 • To provide a flavour of emerging technologies - Cloud, Big Data, AI, 3D printing

Course Outcomes (COs) : On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Identify communication networks and understand its working	1
CO2	Understand the use and applications of digital technology	2
CO3	Summarize knowledge about digital paradigm	2
CO4	Execute the use of digital technology, digital financial tools, e-commerce	3
CO5	Compare the knowledge of e-governance and Digital India Initiatives	4
CO6	Check the knowledge of machine learning and big data	5

Total credits:02   **Total lectures: 30**

Course Content

UNIT I: **Introduction & Evolution of Digital Systems**:   **(14L)**
 Role & Significance of Digital Technology. Information & Communication Technology & Tools. Computer System & it's working, Software and its types. Operating Systems: Types and Functions. Problem Solving: Algorithms and Flowcharts. Communication Systems: Principles, Model & Transmission Media. Computer Networks & Internet: Concepts & Applications, WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking. Computer Based Information System: Significance & Types. E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.

UNIT II: Digital India & e-Governance: **(8L)**
Initiatives, Infrastructure, Services and Empowerment. Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit / Debit Cards, e-Wallets, Internet Banking, NEFT/RTGS and IMPS, online Bill Payments and PoS, Cyber Security: Threats, Significance, Challenges, Precautions, Safety Measures & Tools.

UNIT III: Emerging Technologies & their applications: **(8L)**
Overview of Cloud Computing, Big Data, Internet of Things, Virtual reality, Block chain, Robotics, Artificial intelligence, 3-D Printing, Future of digital technologies

REFERENCE BOOKS:

1. Data Communication and Networking : Behrouz A. Forounzan, McGraw Hill Education

2. Emerging Technologies in Computing: Theory, Practice and Advances, P.Kumar, A.Tomarand R.Sharmila

3. Cloud Computing A hands on Approach: Arshdeep Bahga, Vijay Madishetti, : University Press

4. Essentials of Cloud Computing: K. Chandrasekharan, CRC Press, 2014

5. Block Chain: Blueprint for a new economy, M. Swan O;Reilly, Media, 2015

6. E-Commerce :K.C. Laudon and C.G.Traver, Pearson 2013

IKS-11 Introduction to Indian Knowledge System

Objectives:
1. To help students pursue Indian way of Knowledge (Jñāna), wisdom (Prajñā), & truth (Satya)
2. To acquaint students with the Indian thought and philosophy
3. To make them understand the contribution of Indian Scholars & philosophers
4. To make students experience the then ethos through field visits & projects

Course features:
Credits: 02,
Clock Hours: 30,
Teaching: 20 Hours,
Field Visit to IKS related Places & a brief report: (Ancients Institutes, Heritage centers, Building, Caves, Temples, Schools of Thoughts, Museums, and Archeological Monuments & Tombs etc.) 10 Clock Hours

I) Introduction to IKS: Indian Knowledge System
1) Bharatavarsha—A Land of Rare Natural Endowments
2) The Purpose of Knowledge in India
3) Scriptures & foundational Literature of Indian Civilisation
4) Indian Science, Health Sciences & Astronomy
5) Indian Education
6) Indian Architecture and Town Planning
7) Indian Fine Arts & Performing Arts
8) Indian Agriculture & Indian Textiles
9) Indian Polity and Economy
10) The Outreach of Indian Knowledge System

Nature of question paper:
The question paper will be of 30 marks. (Examination Duration: 1 Hour & 30 Minutes)
There will be five questions, each of 6 marks with an internal option.
Students are free to attempt the question paper in English, Hindi or Marathi.

Prescribed units are from:
'Introduction to Indian Knowledge System: Concepts & Applications' by B. Mahadevan, Bhat et al.

Suggested References:

1. The Knowledge System of Bhārata by Bhag Chand Chauhan,
2. History of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al.
    National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata (2014). Reference Books
3. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).
4. India's Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010)

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-II
(NEP-2023 COURSE)
MJ-CS 201 : Advanced C programming

Course Outcomes (COs): On completion of the course, a student will be able to:

		Bloom's Taxonomy Level
CO1	Illustrate efficient memory handling techniques in programs with the concepts of pointers and dynamic memory management	1
CO2	Identify and organize data in structures and files to develop small applications.	2
CO3	Apply various string and file handling functions.	3
CO4	Test and validate the data stored in the structures and files and perform various operations on it.	4
CO5	Design simple data processing applications for real-world problems. Develop the concepts for advanced programming like data structures	5,6

Total Credits: 2   **Total Teaching hours : 30**
Course Contents
Unit I : Pointers **(6L)**
Pointer declaration, initialization, Dereferencing pointers, Pointer arithmetic Pointer to pointer, Arrays and pointers, Array of Pointers, Functions and pointers – passing pointers to functions, function returning pointers, Dynamic memory allocation
Unit II: Strings **(4L)**
Declaration and initialization, string input/output, format specifiers, Standard library functions, Strings and pointers, Array of strings, Command Line Arguments
Unit III : C pre-processor **(4L)**
Introduction of Preprocessor directive, File Inclusion directive, Macro substitution, nested macro, macro with arguments, Difference between functions and macros
Unit IV : Structures and Unions **(8L)**
Creating structures, Structure declaration and initialization, Accessing structure members (dot Operator), Array of structures, Passing structures to functions, Nested structures, Pointers and structures, Self-referential structure, Unions: Declaration, Initialization and accessing, Difference between structures and unions, typedef
Unit V : File Handling **(8L)**
Introduction – streams, types of files, Modes of file opening, Operations on files, Random access to files
References :-
1. Byron S Gottfried, Schaum's Outlines Programming With C, Second Edition, Tata McGraw Hill
2. Yashavant Kanetkar: Let Us C, Seventh Edition, PBP Publications
3. E Balagurusamy: Programming in ANSI C, Fourth Edition, TMH
4. Programming in C ,A Practical Approach, Ajay Mittal, Pearson
5. Problem Solving and Programming Concept, Maureen Sprankle, 7th Edition, Pearson Publication

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-II
(NEP-2023 COURSE)

MJ-CS 202 Relational Database Management Systems

Course Outcomes(Cos):On completion of the course, a student will be able to :

		Bloom's Taxonomy Level
CO1	Identify various methods of database security and access control techniques	1
CO2	Understand transaction management and recovery management techniques adopted in relational database management systems.	2
CO3	Apply fundamental concepts of relational database management systems.	3

Total Credits: 2   **Total Teaching hours : 30**

 Course Contents

Unit I: Relational algebra   **(05L)**
Relational algebra Preliminaries, Relational algebra (selection, projection, set operations, renaming, joins, division)

Unit II: Relational Database Design   **(08L)**
 PL/PgSQL: Data types, Language structure, controlling the program flow,conditional statements, loops, Views, Stored Functions, Stored Procedures Handling error and exceptions, Cursors, Concepts of Triggers

Unit III: Transaction Concepts and concurrency control   **(12L)**
Describe a transaction, properties of transaction, state of the transaction.
Executing transactions concurrently associated problem in concurrent execution.
Schedules, types of schedules, concept of Serializability, precedence graph for Serializability, Ensuring Serializability by locks, different lock modes, 2PL and its variations, Basic timestamp method for concurrency, Thomas Write Rule, Locks With multiple granularity, dynamic database concurrency (Phantom Problem), Timestamps versus locking, Deadlock handling methods, Detection and Recovery (Wait for graph), Prevention algorithms (Wound-wait, Wait-die)

Unit IV: Database Security Concepts   **(05L)**
Database Integrity and Security Concepts, database security concepts, crash recovery, recovery concepts, Log base recovery techniques ,database backup and recovery
References:
1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan Database System Concepts, ISBN:9780071289597, Tata McGraw-Hill Education
2. An Introduction to Database Systems", C J Date, Addison-Wesley
3. Database Systems : Concepts, Design and Application", S.K.Singh, Pearson, Education
4. Relational database management system Nirali publication by Kavita Khobragade

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-II
(NEP-2023 COURSE)

MJ-CS 203 Computer Science Practical – II

Computer Science Laboratory   **Credits-2**

Course Outcomes(Cos):On completion of the course, a student will be able to :

		Bloom's Taxonomy Level
CO1	Understand queries implementation and exception handling techniques	2
CO2	Apply queries, functions, triggers, cursors and triggers using PL/SQL.	3
CO2	Identify the concepts of programming in C language	2
CO2	Illustrate the use of advanced concepts of C programming	1
CO2	Execute the dynamic memory management techniques using the concept of pointers, string handling functions and structures in C Programming.	6
CO2	Explain pointers, structures, file handling in C programming	2
CO2	Test and validate the outputs of the C programs	4
CO2	Develop programs to design applications using advanced concepts of C programming	5
CO2	Identify the concepts of programming in C language	2

Assignments of Advanced C:
1. To demonstrate use of pointers
2. To demonstrate concept of strings, array of strings ,using pointers
3. To demonstrate structures (using array and functions)
4. To demonstrate file handling
5. To demonstrate use of preprocessor directives

Assignments of DBMS:
  1.   Assignment to query tables , using nested queries
  2.   Assignment to demonstrate decision making statements and loops
  3.   Assignment to implement stored functions , procedure
  4.   Assignment by implementing error and exception handling techniques
  5.   Assignment based on cursors
  6.   Creating Triggers

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-II
(NEP-2023 COURSE)

Minor: MN-El 21: Fundamentals of Logic Design
Course Objectives:
 1.To get familiar with concepts of digital electronics
 2. To learn number systems, their representation and conversions
 3. To understand basic logic gates, Boolean algebra and K-maps
 4. To study arithmetic circuits, combinational circuits and sequential circuits
Course Outcomes (COs) : On Completion of the course, a student will be able to:

		Bloom's Taxonomy Level
CO1	Identify logic gates with its symbols and truth tables	1
CO2	understand and represent numbers in powers of base, convert one from the other and perform arithmetic operations	2
CO3	Apply the various rules and laws of Boolean Algebra for designing digital circuits	3
CO4	Analyze the arithmetic and logical circuits for specific applications.	4
CO5	Evaluate different logic gates using universal logic gates.	5
CO6	Construct different digital circuits using K-map	6

Total credits:02   **Total lectures: 30**

Course Content

Unit I. Number Systems And conversions   (06L)
 Binary, Octal , Decimal, Hexadecimal number systems, Inter conversions of number systems.BCD, Excess-3 code, , Gray codes .Error detection and correcting codes Rules of binary addition and subtraction, subtraction using 1's and 2's complements,

Unit II. Logic gates And their Applications   (6L)
Introduction to Analog and Digital signals, Positive and Negative logic, pulse waveform.Logic gates: definition, symbols, truth tables, Boolean expressions of NOT, OR, AND, NAND, NOR, EX-OR, EX-NOR gates, Universal gates. Inter conversion of gates.

Unit III. Boolean Algebra and Karnaugh maps   (8L)
Rules and laws of Boolean algebra, De Morgan's theorem,their proofs, simplification of Logic equations using Boolean algebra rules, Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form Introduction to Karnaugh's map. Formation of Pair, Quad and Octet. Significance of Karnaugh Map. Simplification of 2,3 and 4 variables using K-Map

Unit IV. Combinational circuits **(10L)**

Half adder and full adder, 4-Bit Universal adder/ Subtractor, applications of Ex-OR gates as parity checker and generator, study of Multiplexer (4:1) and Demultiplexer (1:4), Encoders : Decimal/BCD to binary, priority encoder, Digital comparator

REFERENCE BOOKS:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Thomas L. Floyd ,Pearson Education
4. Fundamentals of Logic design: Charles H. Roth, Jr. and Larry L. Kinney, CENGAGE Learning

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OE-21: Understanding to Geomorphology -II

Course Objectives:

1. To student will understand the basic concept of Weathering
2. To introduce various concept to understand cycles of erosion.
3. To understand the dynamic nature of the Earth's surface, various processes, and landforms.
4. To study the impact human on geomorphic system.

Course Outcomes (COs): On Completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Understand Weathering and Types of Weathering	1
CO2	Study the erosional and depositional land forms of Rivers, Wind and Sea Waves	2
CO3	Students aware of the need of protection and conservation of different landforms.	3
CO4	Give better explanation about relevant principles, theories and models in geomorphology.	4
CO5	Show clear knowledge relating to man and environmental process and factors.	5

Total credits:02   **Total lectures: 30**

Course Content
Unit I. Weathering   (10L)

Weathering: Meaning and Definition, Factors of Weathering, Types of Weathering: Mechanical /Physical weathering. Chemical Weathering, Biological Weathering.

Unit II. Agents of Erosion and Deposition   (20L)

Evolution of Landforms (Erosional and Depositional): 1 Fluvial 2. Aeolian 3. Glacial 4.Coastal

REFERENCE BOOKS:

1) Physical Geography Doiphode H K KSagar Publication Topic 1-6

2) Morphology and Landscape-H. Robinson

3) The Face of the Earth - Penguins 1980- Dury G.H.

4) Elemetns of Geomprphology – Oxford University Press – Calacutta 2001- Kale V. & Gupta A.

5) Geomorphology - PrayagPustakalaya, Allahabad, 1998- Singh S

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OE-21: Understanding to Climatology-II

Course Objectives:
1. To make the students familiar with new terms and concept of climatology.
2. To define the field of climatology and components of the climate system
3. To introduce various dimensions of climatology like structure and composition.

Course Outcomes (COs): On Completion of the course, a student will be able to:

		Bloom's Taxonomy Level
CO1	Understand the concept of horizontal, vertical temperature and inversion of temperature	1
CO2	Elements of weather and climate and its impacts at different scales.	2
CO3	Identify the Atmospheric pressure and winds humidity and concept of precipitation and its types	3
CO4	Understand the Air masses and Fronts and the Weather Forecasting.	4
CO5	Show clear knowledge relating to man and climatic process and factors.	5

Total credits:02   **Total lectures: 30**

Course Content
. **Unit – II Composition and Structure of the Atmosphere**   **(15L)**

Atmospheric Pressure and wind, Formation of Pressure Belts and their relation with winds, Seasonal variation in pressure belts and Global winds, Monsoon Winds and associated Weather

Unit – II Atmospheric Moisture and Precipitation

Humidity and its type, Forms of condensation, Types of Precipitation

REFERENCE BOOKS:

1. General Climatology   - H. J. Critchfield
2. Atmosphere, Wather& Climate – Routledge 1998 – Barry R.G.& Mather J.R.
3. Climatology-McGraw   - Hill, New York 1974 – Mather J.R.

Foundation of Climatology – Surjeet Publications, Delhi 1982 Stringer E.T.

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-II
(NEP-2023 COURSE)

VSC-201 WEB DESIGNING USING HTML

Course Objectives:
1. To create a dynamic and interactive web page using Javascript
2. To study error handling and form validation for web page
3. To learn client side scripting

Course Outcomes (COs) : On Completion of the course, the students will be able to:

		Bloom's Taxonomy level
CO1	Understand Document Object Model	2
CO2	Build Web page with validation.	5
CO3	Define client side programming language.	1
CO4	Understand form validation which helps to develop interactive webpage.	2
CO5	Design a page using XML Tags	5

Total credits:02   **Total lectures: 30**

Course Contents
Unit I: Introduction to JavaScript   **(8L)**
Basics of JavaScript, advantages of JavaScript, Syntax, Variables, Operators, Conditional Statements, Loop Statement, Functions, events.

Unit II : JavaScript Objects   **(8L)**
Object properties, Methods, User defined objects, String objects, String methods, Date object, Date methods, Math properties, Math Methods, Array properties, Array Methods.

Unit III : Advanced JavaScript   **(8L)**
Document Object Model, Document properties , Document Methods, types of Error, Exception handling, Form Validation

Unit IV: Introduction to XML   **(06L)**
Basics of XML, Advantages of XML, syntax ,attributes, validator, schema, XSLT stylesheet
Reference Books :
1. HTML 4 Unleashed (Second Edition) : Techmedia
2. The Complete Reference HTML : Tata McGRAW-HILL 3rd Edition
 3. Begining Web Programming with HTML XML and CSS :JonDuckett

SEC- 21 : Introduction to the Internet of Things and Embedded Systems
Objectives :
1. To understand the concept of Embedded systems.
 2. To study the design flow and available tools for an Embedded system
3. To learn and understand basics of Internet of Things
4. Get introduce to upcoming technology of Internet of Things
Course Outcomes : On completion of the course, a student will be able to:

		Bloom's Taxonomy level
CO1	Get acquainted with the fundamentals of IoT and embedded system	1
CO2	understand the concept of Embedded systems	2
CO3	use IoT tools such as sensors	3
CO4	analyse the difference between general computing and the Embedded systems	4
CO5	experiment with the design flow and available tools for an embedded system	5
CO6	design the embedded system on chip for system application	6

Total credits:02   **Total lectures: 30**

Contents:
Unit I: Introduction of IoT: **(15L)**
Definition and characteristics of IoT, Physical design of IoT, Logical design of IoT, IoT enabling technologies, IoT Issues and Challenges- Planning, Costs and Quality ,Security and Privacy, Risks and Applications, industrial IoT, Scope & Future of IoT, sensors, actuators, smart objectives, trends in smart objects

Unit II: Embedded Systems: **(15L)**
 Introduction to embedded systems, Application Areas ,Categories of embedded systems, , Hard Real Time System And Soft Real Time System, Specialties of embedded systems, Advantages and disadvantages of Embedded System, Overview of embedded system architecture , Basic Structure Of An Embedded Systems Architecture recent trends in embedded systems, Introduction to microprocessor and microcontroller, RISC and CISC processors

Reference Books:
1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515.
2. Lyla B. Das, "Embedded Systems: An Integrated Approach" Pearson , ISBN: 9332511675, 9789332511675
3. Sriram V. Iyer, Pankaj Gupta, "Embedded Real-time Systems Programming", Tata McGraw-Hill, ISBN: 13: 9780070482845

4. David Hanes, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press, ISBN-13: 978-1-58714-456-1, ISBN-10: 1-58714-456-5, 2017
5. Raj Kamal, "Embedded Systems: Architecture, programming and Design", 2nd Edition, McGrawHill, ISBN: 13: 9780070151253
6. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012, ISBN:978-1-119-99435-0

SEMESTER-II
(NEP-2023 COURSE)
AEC-21: Communication Skills in English – II

Lectures: 30
Credits: 02

Expected Course Outcomes:
After completing the course, a learner should be able to,

CO 1: use English for effective communication,

CO 2: understand written English for better communication,

CO 3: perform in PPT presentations, skits, group discussion and interviews effectively,

CO 4: write various reports and be able to attempt for creative writing.

Course Content:

Unit 1: English Usage in Communication
- Varieties of English
  - American and British English
  - Indian English
- Use of English
- Non-verbal Communication
- The Elevator Pitch
- ICT and the Use of English
- Interviews
- Creative Writing

Unit 2: Enhancing Reading Skills
- Reading Passages

Unit 3: Advanced Oral Communication Skills
- Formal Presentations
- Skits
- Group Discussion
- Interview Skills

Unit 4: Advanced Writing Skills
- Report Writing
  - Newspaper Report
  - Event/Activity Report
- Creative Writing
  - Personal Essay
  - Memoir
  - Short Speech
  - Story Writing
  - Dialogue Writing
  - Statement of Purpose
  - **Prescribed Textbook**: Labade, Sachin et. al. (2021) *Communication Skills in English*. Hyderabad: Orient Blackswan

AEC-21: संज्ञापन कौशल्ये आणि कार्यालयीन लेखन

तासिका - ३०
श्रेयांक -२

अध्ययन निष्पत्ती :

१. संज्ञापन कौशल्ये आत्मसात करण्याची गरज लक्षात येईल.

२. प्रशासनिक क्षेत्रात मराठी भाषेचा अवलंब करण्याचे तंत्र अवगत होईल.

घटक -१ संज्ञापन कौशल्ये (प्राथमिक व प्रगत)   तासिका - १५ श्रेयांक -१

- प्राथमिक व प्रगत कौशल्ये

- संज्ञापन (संवाद) म्हणजे काय?

- संज्ञापनाचे (संवादाचे)महत्त्व

- संज्ञापनातील (संवादातील) अडथळे

घटक - २ प्रशासनिक मराठी (कार्यालयीन लेखन)   तासिका - १५ श्रेयांक -१

- कार्यालयीन पत्रव्यवहार - चौकशीपत्र तक्रारपत्र मागणीपत्र व आवेदनपत्र

- इतिवृत्त लेखन व टिप्पणी लेखन

- अहवाल लेखन

- पत्रकांचे लेखन - सूचनापत्रक, माहितीपत्रक घोषणापत्रक, परिपत्रक

संदर्भसूची:-

१. व्यावहारिक मराठी : डॉ. कल्याण काळे, डॉ.द.दि. पुंडे, निराली प्रकाशन, पुणे.

२. प्रशासनिक लेखन : महाराष्ट्र राज्य, शासकीय प्रकाशन, मुंबई.

३. व्यावहारिक मराठी : संपा. डॉ. स्नेहल तावरे, स्नेहवर्धन प्रकाशन, पुणे.

४. उपयोजित मराठी : संपा. डॉ. केतकी मोडक, प्रा. सुजाता शेणई, संतोष शेणई, पद्मगंधा
   प्रकाशन, पुणे.

F.Y.B.Sc.(COMPUTER SCIENCE)
SEMESTER-II
(NEP-2023 COURSE)
VEC-21: Environmental Studies

Total Credits: 02   **Total Lecture Hrs: 30**

Course Objectives:

    1. Understand concept of environmental science

    2. Understand ecosystem, natural resources and their pollutants in detail

    3. Know the rules and regulations of environment protection, Acts, Laws and policies of the

      Government for the same.

    4. Awareness about Biodiversity and its conservation.

Module No.	Topic in Detail	No. of Lecture Hrs

I	**Introduction to environmental studies and Ecosystems**
	• Multidisciplinary nature of environmental studies; components of environment - atmosphere, hydrosphere, lithosphere and biosphere.
	• Scope and importance; Concept of sustainability and sustainable development.
	• What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems:
	    a) Forest ecosystem
	    b) Grassland ecosystem
	    c) Desert ecosystem
	    d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
		5

II	**Natural Resources: Renewable and Non-renewable Resources** • Land Resources and land use change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. • Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). • Heating of earth and circulation of air; air mass formation and precipitation. • Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	5

III	**Biodiversity and Conservation** • Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots • India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.	**5**
IV	**Environmental Pollution** • Environmental pollution : types, causes, effects and controls; Air, water, soil, chemical and noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste.. • Pollution case studies.	**5**
V	**Environmental Policies & Practices** • Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. • Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC). • Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context	**5**
VI	**Human Communities and the Environment** • Human population and growth: Impacts on environment, human health and welfares. • Carbon foot-print. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquakes, cyclones and landslides. • Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan. • Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. • Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).	**5**

Course Outcomes:
At the end of this course the students will be able to:
   1. Understand their roles in environmental protection
   2. Be aware of their ecosystem, natural resources and pollutants.
   3. Follow the rules and regulations of environment protection Acts, Laws and policies of the
      Government for the same.
   4. Spread awareness about Biodiversity and its Conservation.
   5. Become responsible citizens with a sense of gratitude towards the environment and cause less
      harm to it.

References:
   1. D. K. Asthana, M. Asthana, 2014. *A textbook of Environmental Studies*. S. Chand Publishing, New Delhi, India
   2. Carson, R. *2002. Silent Spring.* Houghton Mifflin Harcourt.
   3. Gadgil, M., & Guha, R.1993. This *Fissured Land:* An Ecological History of India. Univ. of California Press.
   4. Gleeson,B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
   5. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
   6. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
   7. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatement.* Oxford and IBH Publishing Co. Pvt. Ltd.
   8. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment.* 8th edition. John Wiley & Sons.
   9. Rosencranz, A., Divan, S., & Noble, M.L. 2001. *Environmental law and policy in India.* Tripathi 1992.
   10. Sengupta, R. 2003.*Ecology and economics:* An approach to sustainable development. OUP.
   11. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation.* S. Chand Publishing, New Delhi.
   12. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology: Voices from the Tropics.* John Wiley & Sons.
   13. Thapar, V. 1998. *Land of the Tiger: A Natural History of the Indian Subcontinent.*
   14. www.nacwc.nic.in
   15. www.opcw.org