

P. D. E. A's
Prof. Ramkrishna More Arts, Commerce and Science
College Akurdi Pune-411044

Affiliated to



Savitribai Phule Pune University [SPPU]



B. Voc. Software Development
(Under Faculty of Science and Technology, Savitribai Phule Pune University)

Choice Based Credit System [CBCS]
Under
Autonomy and NEP-2020

From Academic Year
2025-2026

Syllabus
Second Year Graduate (S.Y. B. Voc.)
Software Development

Board of Studies Software Development

Rules and Regulations

1. National Credit Framework (NCrF): For creditisation and integration of all higher education qualifications leading to a certificate/ diploma/ degree with multiple entry and exit options, college will refer to National Credit Framework (NCrF) which encompasses the qualification frameworks for higher education, vocational and skill education and school education, namely National Higher Education Qualification Framework (NHEQF), National Skills Qualification Framework (NSQF) and National School Education Qualification Framework (NSEQF) respectively.

2. Structure of Four years multidisciplinary UG Programme and Five Years Integrated Multidisciplinary Master's Degree Programmes with Multiple Entry and Exit Options at Different Levels:

- (i) Students will have the flexibility to enter four years multidisciplinary Under Graduate Programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs.
- (ii) Students will get a Certificate after a One year programme (minimum 40 Credits), a Diploma after two years (minimum 80 Credits), a Bachelor's degree after three years (minimum 120 Credits), and a Bachelor's degree with Research or Honours after Four years (minimum 160 Credits).

3. Qualification Type and Credit Requirements of Four Years Multidisciplinary Degree Programme with Multiple Entry and Exit Options

- (i) Details of qualifications, minimum credit requirements, exit credit courses, year and semester are as under:

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	UG Certificate	40	44	2	1
5.0	UG Diploma	80	88	4	2
5.5	Three Years Bachelor's degree	120	132	6	3
6.0	Bachelor's degree Honour's with Major	160	176	8	4
	Bachelor's degree Honour's with Major	160	176	8	4
7.0	Master's Degree	200	220	10	5
8.0	Ph. D.	----	-----	-----	----

- (ii) An exit 6-credit bridge course(s) lasting two months, including at least 6-credit job specific internship/apprenticeship that will help the graduates acquire job-ready competencies required to enter the workforce will be an additional requirement for the award of the undergraduate Certificate/ Diploma/ three year Bachelor's Degree.
- (iii) On exit, the students will have the option to re-enter the programme in the college, or in a different higher education institution. Re-entry at various levels for lateral entrants in academic programmes should be based on the earned and valid credits as deposited and accumulated in the Academic Bank of Credits (ABC) through Registered Higher Education Institutions (RHEI) and proficiency test records.
- (iv) Eligibility for admission to the fourth year of four-year **Honours with Research Degree Programmes** as per UGC guidelines: Minimum CGPA of 7.5 or minimum 75% at three-year degree.

- (v) PG curriculum, as illustrated below, have flexibility a) One-year Post-Graduate Diploma (PGD), b) Two year Post-graduate Programme and c) 5 Years Master's degree programmes with multiple Entry and Exit options at different levels.

(a) Post-Graduate Diploma (PGD): Programme duration- One year (2 semesters) after any bachelor's degree, min. 40 credits

(i) UGC: 1-Year (2 semesters) Post-Graduate Diploma (PGD) after 3-years Bachelor's degree: Level 6.0

(ii) UGC: 1-Year (2 semesters) PGD after 4 years Bachelor's degree (Honors/ Research): Level 6.5

(b) Master's Degree:

(i) UGC: 2-Years (four semesters) Master's Degree after obtaining a 3-years Bachelor's degree, Minimum 40 credits/year, second year devoted entirely to research, PG – 2nd year: Level 6.5

OR

(i) 1-Year (two semesters) Master's Degree after obtaining a 4-year Bachelor's degree (Honours/Research): Minimum 40 credits: Level 6.5

(c) Level 8 represents Ph. D. Research Degree.

(d) A 5-year Integrated Bachelor's and Master's programme shall have a minimum of 220 credits.

(e) Master's and doctoral programmes, while providing rigorous research-based specialization, should also provide opportunities for multidisciplinary work, in academia, government, research institutions, and industry.

4. Lateral Entry/ Re-entry at higher Levels after exit from lower levels of four years multidisciplinary UG degree programme:

(i) The credit points earned and accumulated shall be used to determine the eligibility for taking admission to various programs at multiple levels, subject to fulfilment of the broad principles laid down under NCERF. Students who leave with a Certification, Diploma, or a Basic Bachelor's Degree will be eligible to re-enter the programme at the exit level to complete or progress to the next level through lateral entry mode. Depending upon the academic and physical facilities available, the State Universities/ Autonomous Colleges (Higher Education Institutions or HEI) may earmark specific seats/ intake for lateral entry into the second year/ third year/ fourth year of a four years multidisciplinary UG degree programme as approved by Professional Standard Setting Bodies (PSSB/Govt. of Maharashtra/ statutory council of affiliating University plus any consequential vacancies caused by exits to an ongoing programme (four-year Degree Programme and Integrated Master's or second year Master's). Lateral entry or Re-entry is open to those students if he/she has either –

(a) successfully completed the first year/second year/third year of the particular four years multidisciplinary degree programme in any ABC registered HEI with valid credits in ABC and re-entering into the second year/third year/fourth year, respectively of the same four years degree programme of any ABC registered HEI, within stipulated/ permissible period of years as decided by Statutory Councils of that HEI

OR

(b) Already successfully completed a multidisciplinary four-year first-degree programme and is desirous of and academically capable of pursuing another multidisciplinary four years first-degree programme in an allied subject.

(ii) A student will be allowed to enter/re-enter only at the odd semester. Re-entry at various levels for lateral entrants in academic programmes should be based on the earned and valid credits as deposited and accumulated in Academic Bank of Credits (ABC) through Registered Higher Education Institutions (RHEI) and proficiency test records. However, in terms of the admission eligibility requirements, the student shall belong to the same faculty/ discipline in terms of Major Subject i.e., the Major subject of his earlier Programme and the Major subject of the new Programme for which he is seeking admission must be from

the same faculty/discipline. Reservation for lateral entry will be executed as per the Government of Maharashtra norms.

5. Distribution of Credits across Multidisciplinary Four Years Degree Programme:

- (i) Four-year multidisciplinary degree programme with Honours/ Specialization Degree will have Internship and Core /Major Courses with a minimum of 22 credits per sem. in the Fourth Year.
- (ii) Four-year multidisciplinary degree programme with Research will have Research Projects, Seminars, Dissertations and Internships with a minimum of 22 credits per Sem. in the Fourth Year.
- (iii) Students shall select a 'Major or Core Subject/ Discipline' and a '**Minor Subject/Discipline**' from the lists of various Subject Combinations and Options provided the Colleges. In general, for the four years multidisciplinary bachelor's degree programme, the distribution of credits will be as follows:
 - (a) Disciplinary/interdisciplinary Major/ Core Subject (minimum of 68 credits)- Mandatory and Elective Courses
 - (b) Disciplinary/interdisciplinary Minor Subject (maximum of 22 credits)
 - (c) Skill based/Vocational studies corresponding to the Major/ Core Subject (8 credits)
 - (d) Field projects/internship/apprenticeship/community engagement and service corresponding to the Major/ Core Subject (14-22 credits) with a maximum of six credits per Semester
 - (e) Generic/ Open Electives through Baskets of Elective Courses (12 credits),
 - (f) Ability Enhancement Courses including Languages, Literature and Environmental Studies (12 credits),
 - (g) In-built modules on the Indian Knowledge System (IKS) in Major/ Core Subject at Level 4.5 – 2 credits
 - (h) Value-based Education, Life Skills and Professional Ethics: Co-curricular Courses such as Sports and Culture, NSS/NCC and Fine/ Applied/Visual Arts (8 credits).

Student can earn some credits (SEC/VSC/GE/OE) in the form of online from-

- (i) The National Skills Qualifications Framework (NSQF) organizes qualifications for Vocational and Skill Courses in a series of 8 levels based on professional knowledge, professional skills, core skills and responsibilities, in the increasing order of complexity and competency.
- (ii) University Grants Commission (Credit Framework For Online Learning Courses through Study Webs of Active-Learning for Young Aspiring Minds) Regulations, 2021, **permits up to 40 per cent of the total courses being offered in a particular programme in a semester through the Online Learning Courses offered through the Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) platform.**

6. Examination and Assessment Process:

- (i) The basic principle of the credit framework is that credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- (ii) Exit options are provided with certification, diploma and basic Bachelor's degrees to the students at the end of the second, fourth and sixth semesters of a four years multidisciplinary degree programme. Students will receive a Bachelor's degree with Honours/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- (iii) For the smooth success of four-year multidisciplinary degree programme with multiple entry and exit systems, the examination mode will be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit)

examination modes. This is in line with the UGC Report on 'Evaluation Reforms in Higher Educational Institutions (2019)'.

(iv) Evaluation of each students in each course will be done as follows

- a. Each theory or practical course will be of 2 credits = 50 marks
- b. Internal evaluation 30% weightage (15 marks)
- c. External evaluation 70% weightage (35 marks)
- d. Students should secure 40% marks in each type of evaluation for successful completion of a course (student should secure at least 6 marks in internal and 14 marks in external evaluation).

(v) Evaluation Pattern.

a. Internal evaluation - Two written test, each of 20 marks will be conducted i. e. two tests on two modules. 1st assignment after completing 6 weeks of teaching and 2nd on completion of 13th week of teaching. 5 marks out of 15 will be assigned from these written tests. Remaining 10 marks will be assigned from other types of evaluation such as seminars, orals, poster presentation, open book challenging tests, surprise test, objective test etc. Examination (Internal and external) will conducted so that CO, PO, PSO can be evaluated.

b. External Evaluation - External evaluation will be done at the end of each semester.

- i. For theory, 35 marks written examination will be conducted and time of examination will be 2-hours.
- ii. For practical, 35 marks practical examination will be conducted and time of examination will be 4-hours.
- iii. For project / field project, 35 marks evaluation will done on the basis of viva-voce and examination of thesis by the examiners.
- iv. For OJT 35 marks evaluation will be done on the basis of report of industrial mentor / supervisor / industry and viva-voce. However, student has to produce and submit OJT certificate from competent authority of industry.

7. Attendance: The student must have at least 70% attendance, to appear any type of examination.

8. Declaration of Results:

- (i) Declaration of result is based on the Semester Grade Point Average (SGPA) earned towards the end of each semester or the Cumulative Grade Point Average (CGPA) earned at the completion of all eight semesters of the programme and the corresponding overall alpha-sign or letter grades as given in Table 2. If some candidates exit at the completion of the first, second or third year of the four years Undergraduate Programmes, with Certificate, Diploma or Basic Degree, respectively, then the results of successful candidates at the end of the second, fourth or sixth semesters shall also be classified on the basis of the CGPA obtained in the two, four, six or eight semesters, respectively. Successful candidates at the end of the tenth semester of the integrated Master's Degree Programmes shall also be classified on the basis of CGPA obtained in the ten semesters of the Programmes. Likewise, the successful candidates of one year or two semesters Master's Degree Programme are also classified on the basis of the CGPA of two semesters of the Master's Degree Programme.

Table-2: Grades on degree certificate/mark sheet will be assigned to the students as per the following table

Semester GPA/ Program CGPA Semester/Program	% of Marks	Alpha-Sign / Letter Grade Result
9.00-10.00	90-100	O (outstanding)
8.00 - <9.00	80.00 – <90.00	A+ (Excellent)
7.00 - <8.00	70.00-<80.00	A (Very Good)
6.00 - <7.00	60.00-<70.00	B+ (Good)
5.50 - <6.00	55.00-<60.00	B (Above Average)

5.00 - <5.50	50.00-<55.00	C (Average)
4.00 - <5.00	40.00-<50.00	P (Pass)
Below 4.00	< 40	F (Fail)
Ab	-----	Absent

- (ii) A student obtaining Grade F shall be considered failed and will be required to reappear in the examination. For non-credit courses ‘Satisfactory’ or ‘Unsatisfactory’ shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

9. Award of Major and Minor Degree:

- (i) A student pursuing four-year multidisciplinary UG programme will be awarded an appropriate Honours/ Research degree in Major/ Core Subject on completion of VIII Semester with the minimum of 176 credits if he secures in that Subject at least 50% of the total credits for that programme. He shall thus study the specific number of Mandatory Core Courses, Core Electives, Vocational and Skill Courses and Field projects/ Internships connected to Core Subjects in eight semesters so as to cover at least 50% of the total credits.
- (ii) In case of Research Degree, a student shall pursue research project and write dissertation in that Major in the VII and VIII semesters.

On the basis of above rules and regulations under NEP-2020 following course frame work is adopted by the Prof. Ramkrishna More Arts, Commerce and Science College, Akurdi, Pune-411044 for the completing of four years honours degree in Major and Minor subjects.

10. Distribution of Credits across Four Years Degree Programmes:

In general, for the four years’ bachelor’s degree programme, the distribution of credits will be as follows:

(a) Major (Core) Subject comprising Mandatory and Elective Courses:

- Minimum 50% of total credits corresponding to Three/Four - year UG Degree- Mandatory Courses offered in all Four years;
- 2 credit course on Major Specific IKS shall be included under Major;
- Elective courses of Major will be offered in the third and/or final year.
- Vocational Skill Courses, Internship/ Apprenticeship, Field Projects, Research Projects connected to Major first to fourth year.

(b) Minor Subject: 18-20 Credits

- The Minor subjects may be from the different disciplines of the same faculty of DSC Major (Core) or they can be from different faculty altogether.
- The credits of Minor subjects shall be completed in the first three years of UG Programme.

(c) Generic/ Open Elective Courses (OE): 10-12 credits

- It is to be offered in I and/or II year
- Faculty-wise baskets of OE shall be prepared by University/ Autonomous Colleges.
- OE is to be chosen compulsorily from faculty other than that of the Major.

(d) Vocational and Skill Enhancement Courses (VSEC): 14-16 credits

Vocational Skill Courses (VSC): 8-10 credits, including Hands on Training corresponding to the Major and/or Minor Subject:

- To be offered in first to three years;
- Wherever applicable vocational courses will include skills based on advanced laboratory practicals of Major

Skill Enhancement Courses (SEC): 06 credits

- To be offered in I and II year;
- To be selected from the basket of Skill Courses approved by University/ Autonomous Colleges

(e) Ability Enhancement Courses (AEC), Indian Knowledge System (IKS) and Value Education Courses (VEC): 14 Credits

1. AEC: 08 credits

- i. To be offered in I and II year
- ii. English: 04 Credits
- iii. Modern Indian Language: 04 credits
- iv. To be offered from the Basket approved by the College;
The focus for both languages should be on linguistic and communication skills.

o IKS: 2 Credits

- i. To be offered in I Year
- ii. Courses on IKS to be selected from the basket of IKS courses approved by the Colleges

o VEC: 04 Credits

- i. To be offered in I year
- ii. Value Education Courses (VEC) Environmental Science Education (Compulsory), Understanding India, and Digital and Technological Solutions.

(f) Field Projects/ Internship/ Apprenticeship/ Community Engagement and Service corresponding to the Major (Core) Subject, Co-curricular Courses (CC) and Research Project

o Internship/Apprenticeship corresponding to the Major (Core) Subject: 8 Credits

o Field Projects/Community Engagement and Service corresponding to the Major (Core) Subject: minimum 4-6 credits

To be offered in II, and III years of UG Degree Programmes.

o Co-curricular Courses (CC) such as Health and Wellness, Yoga education sports, and fitness, Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts: 8 credits. To be offered in I and/or II year

o Research Projects: 12 credits

To be offered in the final year for 4-year Honours with Research UG Degree

The UGC Regulations, 2021 permit up to 40% of the total courses being offered in a particular programme in a semester through the Online Learning Courses offered through the SWAYAM platform and/or other State Level Common Platforms which can be developed in due course with the participation of different Universities/ HEIs.

Abbreviations: Generic/ Open Electives: **GE/OE**; Vocational Skill and Skill Enhancement Courses: **VSEC**; Vocational Skill Courses: **VSC**; Skill Enhancement Courses: **SEC**; Ability Enhancement Courses: **AEC**; Indian Knowledge System: **IKS**; Value Education Courses: **VEC**; **OJT**: On Job Training; Internship/ Apprenticeship; Field projects: **FP**; Community engagement and service: **CEP**; Co-curricular Courses: **CC**; Research Methodology-**RM**; Research Project: **RP** Note: The Credit Distribution Table given above is illustrative only. The Universities/ Autonomous Colleges may suitably modify within the broader framework of credit distribution across six verticals.

11. Definitions:

i. One semester = 15 weeks

ii. 1-credit theory = 15 hours i.e. for 1 credit, 1 hour per week teaching is to be performed.

15 hours of 1-credit are splinted as 12 hours actual teaching + 3 hours Tutorial (Numerical problem solving sessions, revision on difficult topics, dialog on student's difficulties, and internal evaluation)

iii. 1-credit practical = 30 hours. Thus, 1 credit practical = 2 contact hours in laboratory per week. 30 hours splinted as 24 hours actual table work and 6 hours for journal competition, oral on each practical and other internal evaluation.

iv. Each theory course of any type (major, minor, VSC, VEC, OE/GE, VEC, SEC, CC, etc.) **is of 2 credits.**

v. Theory per semester: Each theory course is of 2 credits. Thus, for each theory course contact hours = 24 teaching + 6 tutorials

vi. Each practical course is of 2 credits = 60 hours per semester

- a. Minimum 12 laboratory sessions will be conducted in one semester.
- b. Each laboratory sessions will be of 4 hour.

Abbreviations:

VSC- Vocational Skill Course; SEC- Skill Enhancement Course; IKS- Indian knowledge System
FP- Field Project; CEP- Community Engagement Project; OJT- On job Training
AEC- Ability Enhancement Courses; VEC- Value Education Course; CC- Curricadar Coures
GE/OE- Generic or Open elective courses; RP - Research Project RM- Research Methodology

T-Theory P -Practical

1. A student can select two subject from the same faculty in first year. At second year from Subject-1& 2 student will select any one subject as major and one subject as minor. student cannot select Major and minor subjects other than these two subjects taken at first year.
2. **VSC, IKS-2, OJT, FP, CEP, RP, PM should be related to Major subject**
3. **OE/GE** - Must be selected form basket approved by college and selected from the faculty other than faculty of Major subject.
4. **SEC should be selected from the basket of same faculty approved by the college.**
5. Each theory course may be of 2 or 4 credit; each practical course should be of 2 credit only.
6. For those subject's practical cannot be conducted; they have to convert practical credits into theory credits. The decision should be taken BOS of respective subject.
7. This credit framework is applicable to all faculties in the college. The courses which are under AICET, they must take approval to this framework from AICET or respective body.

NEP Coordinator IQAC Coordinator Deans Vice Principal Principal

1. Arts Faculty: _____
2. Commerce Faculty: _____
3. Science Faculty: _____

P.D.E.A's. Prof. Ramkrishna More Arts, Commerce and Science College Akurdi, Pune-411044
Revised Credit Framework / Structure for NEP-2020; CBCS Pattern-2024 with two Major at FY
To be Implemented from Academic Year 2024-25

[illegible]

**Courses Offered by B. Voc. (Software Development) Department at
Second year of Graduation**

Subject-1 (Major)			
Semester	Course code	Generic Name	Title of the paper
III	SDMAT-231	B. Voc. (Software Development) Theory Paper-5	Core Java
	SDMAT-232	B. Voc. (Software Development) Theory Paper-6	Artificial Intelligence
	SDMAP-233	B. Voc. (Software Development) Practical Paper-3	Core Java Lab
IV	SDMAT-241	B. Voc. (Software Development) Theory Paper-7	Advanced Java
	SDMAT-242	B. Voc. (Software Development) Theory Paper-8	Web Security
	SDMAP-243	B. Voc. (Software Development) Practical Paper-4	Advanced Java Lab
Subject-2 (Minor) Courses			
III	ESMAT-231	Minor B. Voc. (Software Development) Theory Paper-5	.Net Framework
	ESMAP -232	Minor B. Voc. (Software Development) Practical Paper-3	.Net Framework Lab
IV	ESMAT -241	Minor B. Voc. (Software Development) Theory Paper-6	MVC Framework
	ESMAP -242	Minor B. Voc. (Software Development) Practical Paper-4	MVC Framework Lab
Vocational Skill Course (VSC)			
III	SDVST-231	Vocational B.Voc.(Software Development) Theory -I	Web Graphics and UI Design
IV	SDVSP-241	Vocational B.Voc.(Software Development) Practical-I	Mini Project-I
Field Project			
III	SDFPP-231	B. Voc. (Software Development) Field project-I	Field Project
Indian Knowledge System (IKS)			
III	SDIKT-231	Indian knowledge system Theory-II	Indian Number System
Community Engagement Program (CEP)			
IV	SDCEP-241	B. Voc. (Software Development) Community Engagement -I	Community Engagement Program
Skill Enhancement Course (SEC)			
IV	SDSEP-241	Skill Enhancement Course Practical-III	Mini Project-II
Ability Enhancement Course (AEC)			
III	ENAET-231	Ability Enhancement Course Paper-III	English Communication and Soft Skills-I
IV	ENAET-241	Ability Enhancement Course Paper-IV	English Communication and Soft Skills-II
Curricular Courses (CC)			
III	CCHRT-231	Co- Curricular Courses-II	Human Rights-I
IV	CCCST-241	Co- Curricular Courses-III	Cyber Security

Generic Elective / Open Elective (GE/OE)			
III		GE/OE	Select from college basket
IV		GE/OE	Select from college basket

Program Outcomes: B. Voc (Software Development)

PO-1: Ability of judicious mix of skills relating to a profession and appropriate content of General Education.

PO-2: Ability about adequate knowledge and skills for employment and entrepreneurship.

PO-3: Career opportunities in programming, web development and software development.

PO-4: Ability to write computer code in a logical, structured, and organized manner.

PO-5: Ability to learn Communication Skills and sharpen business acumen to help succeed in today's complex workplaces.

PO-6: Enhance employability of the graduates and meet industry requirements.

PO-7: Ability to establish themselves as effective professionals by solving real problems through use of computer knowledge

PO-8: Ability to develop professional skill that prepares them for immediate employment and for lifelong learning in advanced area of software and related fields.

PO-9: Ability to deliver a quality product for business success

PO-10: Ability to communicate effectively with wide range of audiences.

PO-11: Ability to Design, implement and evaluate a computer base system, process, component or program to meet desired needs.

PROGRAM SPECIFIC OUTCOMES:

PSO1: Ability to apply knowledge to work in a team as well as to lead team.

PSO2: Ability to write effective project reports in the context of changing technologies.

PSO3: An Ability to analyze the local and global impact on computing, on individuals, organization and society

PSO4: An ability to innovate new ideas and solution to existing problems.

Semester-III, Subject-I, Theory Paper-5

SDMAT-231: Core Java

[Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Introduction to Java	2
	Object, Classess, Methods	5
	Object and Object Oriented Programming	5
II	Collection Framework	4
	Exception Handling	4
	String ,Streams and files	4

Note: Each lecture is of 1 hour

Module-1

[12L+3T]

Chapter-1: Introduction to Java

[2 L]

A Short History of Java, Features of Java, Comparison of Java and C++, Java Tools And Editors(Appletviewer,Jar,Jdb), Java Environment.

Ref-3 pp. 11-15, Ref-1 pp. 11-16

Chapter-2: Object, Classes and Methods

[5 L]

Defining Your Own Classes and Use of ‘this’ Keyword, Using Predefined Classes, Object the cosmic class, Constructor and Overloading Constructors, Method Parameters, Static Fields and Methods, Access Specifiers (public, protected, private, friendly (default)), Creating Accesses and using Packages, Wrapper Classes, Garbage Collection(finalize() Method), Interface and Inner Classes

Ref-1 pp. 109-159, Ref-2 pp. 156-183

Chapter-3: Objects and Object-Oriented Programming (OOP)

[5 L]

Object oriented methodology, Features, advantages and Applications of OOPS, Inheritance (use of Super Keyword, Method Overriding and Use of final keyword), Polymorphism, Encapsulation, and Abstraction.

Ref-1 pp. 161-185, Ref-2 pp. 215-237

Module-2

[12L+3T]

Chapter-4: Collections Framework

[4 L]

Overview of Collections, List, Set, Map, ArrayList, LinkedList, HashSet, HashMap, Iterators and Enumerations, Traversing collections, Understanding iterators

Ref-3 pp. 341-354

Chapter-5: Exception Handling

[4 L]

Dealing Errors, catching exception and exception handling, throw and throws keyword, Creating user defined exception, Using assertion.

Ref-1 pp. 213-230

Chapter-6: Strings, Streams and Files

[4 L]

String class and StringBuffer Class, Stream classes, Byte Stream classes, Character Stream Classes, Using the File class,

Creation of files, Reading/Writing characters and bytes, Handling primitive data type.

Ref-2 pp. 482-511, **Ref-1** pp. 301-315

Reference-1: Complete reference Java by Herbert Schildt

Reference-2: Java 2 programming black books by Steven Horlizer

Reference-3: Programming with Java, A primer by E. Balagurusamy

Course Outcome

At the end of course, student will be able to -

CO 1: Student will be able to use the syntax and semantics of java programming language and basic concepts of OOP.

CO 2: Students will be able to develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.

CO 3: Students will be able to apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.

CO 4: Students will be able to design event driven GUI and web related applications which mimic the real world scenarios

Semester-III, Subject-I, Theory Paper-6

SDMAT-232: Artificial Intelligence

[Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Introduction to Artificial Intelligence	3
	Problems, Problem Spaces and search	4
	Searching Algorithms	5
II	Knowledge Representation	5
	Slot and Filler Structures	3
	Recent Trends in AI and Applications	4

Note: Each lecture is of 1 hour

Module-1

[12L+3T]

Chapter-1: Introduction to Artificial Intelligence

[3L]

Introduction to AI, Comparison of AI, Machine Learning, Deep Learning, Applications of AI, AI Techniques, Intelligent Agents, Agents and Environments, Structure of Agents

Ref-2: Chapters-1. pp 1-16, Chapters-2. pp 34-46,

Chapter-2: Problems, Problem Spaces and search

[4L]

Defining problem as a State Space Search, Production System, Problem Characteristics, Search & Control Strategies, Problems – Water Jug problem, Missionary Cannibal Problem, Block words Problem, Monkey & Banana problem.

Ref-1: Chapter-2, pp 25-45,

Chapter-3: Searching Algorithms

[5L]

Uninformed Search Algorithms/Blind Search Techniques-Breadth-first Search and Depth-first Search, Informed (Heuristic) search Techniques- Generate-and-test, Simple Hill Climbing, Best First Search, Constraint Satisfaction, Means End Analysis, A* and AO*

Ref-1: Chapter-3, pp 50-72 **Ref-2:** Chapter-3, pp 64-102

Module-2

[12L+3T]

Chapter-4: Knowledge Representation

[5L]

Definition of Knowledge. Types of knowledge (Procedural and Declarative knowledge) Approaches to Knowledge Representation, Knowledge representation using Propositional and Predicate logic, Conversion to clause form, Resolution in Propositional logic, Resolution in Predicate logic.

Ref-1: Chapter-5, pp 98-193 Chapter-10, pp 222-227

Chapter-5: Slot and Filler Structures

[3L]

Weak structures (Semantic networks and Frame), Strong structures (Conceptual dependencies and Script)

Ref-1: Chapter-9, pp 188-124 Chapter-5, pp 129-134

Chapter-6: Recent Trends in AI and Applications

[4L]

Introduction to Machine Learning, Types of Learning, (Supervised, Unsupervised and Reinforcement Learning), Predictive Analytics (Weather Forecasting) AI-Powered Chatbots (SBI card Chabot (ILA))

Ref-3: Chapter-1, pp 1-13 Chapter-2, pp 21-41

Reference-1: Artificial Intelligence, Tata McGraw Hill, Elaine Rich and Kevin Knight

Reference-2: Computational Intelligence, Eberhart, Elsevier, ISBN 9788131217832 **Reference-3:**

Artificial Intelligence: A New Synthesis, Nilsson, Elsevier, ISBN 9788181471901 4. Introduction to Artificial Intelligence and Expert System, Dan Patterson, Prentice Hall of India Pvt. Ltd., New Delhi, 1997

Reference-4: Artificial Intelligence: A Modern Approach, Russel & Norvig, Pearson Education

Reference-5: Introduction to Machine Learning, Ethem Alpaydin, PHI

E-References: 1. <https://www.oracle.com/in/chatbots/what-is-a-chatbot/>

2.

<https://www.dataversity.net/case-study-predictive-analytics-and-data-science-keep-aneye-onthe-weather/>

3. <https://www.senseforth.ai/conversational-ai-case-studies/SBI-Cards/>

Course Outcome:

At the end of course, student will able to -

CO 1: Apply the suitable algorithms to solve AI problems

CO 2: Identify and apply suitable intelligent agents for various AI applications.

CO 3: Build smart system using different informed search / uninformed search or heuristic approaches.

CO 4: Represent complex problems with expressive language of representation identify/characterize/define a problem.

CO 5: Recognize the potential of AI to drive innovation and transformation in different domains.

CO 6: Apply difficult real life problems in a state space representation so as to solve those using AI techniques like searching and game playing.

Semester-III, Subject-I, Practical Paper-3

SDMAP-233: Core Java Lab

[Practical, 2 Credits Paper, 60 L]

List of Experiments:

1. Assignment to demonstrate Java Basics using Java tools, javac, java, javap, javadoc, jdb.
2. Assignment to demonstrate creating objects, using new, static keyword, final. Setting the class path, constructors
3. Assignment to demonstrate Packages
4. Assignment to demonstrate Arrays of Objects Console I/O
5. Assignment to demonstrate Scanner.BufferedReader.Wrapper classes
6. Assignment to demonstrate Inheritance.
7. Assignment to demonstrate Interfaces.
8. Assignment to demonstrate Exception Handling User define exceptions & use of keywords.
9. Assignment to demonstrate File Handling I.
10. Assignment to demonstrate File Handling II.
11. Assignment to demonstrate Implementation of list, Set, ArrayList in Collection

Course Outcomes (CO)

CO-1: Students will be able to Understand how to create and manipulate objects in Java, using constructors, the new keyword for efficient code.

CO-2: Students will be able to Demonstrate a solid understanding of inheritance, interfaces, and class relationships, creating reusable and maintainable code in Java.

CO-3: Students will be able to Design Java applications that are both error-resistant and scalable, ensuring that the program behaves well in different environments and edge cases.

CO-4: Students will be able to Handle both predefined and user-defined exceptions, ensuring that Java applications run without unexpected crashes and errors.

Semester-III, Subject-I, Theory Paper-7

SDMAT-241: Advanced Java [Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Multi-Threading	2
	JDBC	3
	User Interface Components with AWT and Swing	5
	Applet Programming	2
II	Servlet	3
	Remote Method Invocation	3
	Introduction to JSP	3
	Java Beans	3

Module-2

[12L+3T]

Chapter-1: Multi-Threading

[2]

Threading basics, Life cycle of thread, Creating Threads, Priorities and Synchronization
Ref-1 pp. 233-261

Chapter-2: JDBC

[3]

The design of JDBC, Basic JDBC program Concept, Drivers, Making the Connection, Statement, ResultSet, Executing SQL commands, Executing queries
Ref-3 pp. 1261-1267

Chapter-3: User Interface Components with AWT and Swing

[5]

What AWT ? What is Swing? Difference between AWT and Swing, The MVC Architecture and Swing, Layout Manager and Layouts, The JComponent class, Components - Buttons and Labels , Checkboxes and Radio Buttons , Lists and Combo Boxes along with the JScrollPane Class, Menus – Scrollbars and Sliders(JScrollBar and JSlider), Dialogs (Message, confirmation, input (like file selection) and options(like color chooser)), Event Handling: Event sources, Listeners, Adapters, Anonymous class

Ref-1 pp. 797-811

Chapter-4: Applet Programming

[2]

Applet Life Cycle, Applet HTML Tags, Passing parameters to Applet, Repaint() and Update() method
Ref-1 pp. 747-767

Module-2

[12L+3T]

Chapter-5: Servlet

[3]

Introduction, Life cycle of servlet, Types of servlet, Session Tracking, Cookie class, Servlet- Jdbc
Ref-1 pp. 1211-1232

Chapter-6: Remote Method Invocation

[3]

Introduction to remote object, RMI architecture, Stubs and skeleton, Registry, Setting up RMI, Using RMI with applet

Ref-1 pp. 747-767

Chapter-7: Introduction to JSP

[3]

Components of JSP – Directives, Tags, Scripting Elements, Building a simple application using JSP

Ref-2 pp. 01-37

Chapter-8: Java Beans

[3]

What is bean, Advantages, Using Bean Development kit(BDK), Introduction to jar and manifest files, The java beans API

Ref-1 pp. 1199-1206

References:

1. Java the Complete Reference, ninth edition by Herbert Schil
2. Head First Servlets and JSP by Bryan Basham.

Course Outcomes (CO): SDMAT-243: Web Security

CO-1: Students will be able to gain the knowledge of J2EE architecture

CO-2: Students will be able to create dynamic web pages, using Servlets and JSP.

CO-3: Students will be able to build Web Applications using Java Servlet API and Java Server Pages

CO-4: Students will be able to apply event handling on AWT and Swing components

CO-5: Students will be able to identify Java code utilities in applets, Java packages, and classes

Semester-III, Subject-I, Theory Paper-8

SDMAT-242: Web Security

[Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Introduction to Web Security	3
	Web Basics	3
	Network Security	6
II	Client-side Attacks and Defenses	4
	Server-side Attacks and Defenses	3
	Web Security in the Real World	5

Module-2

[12L+3T]

Chapter-1: Introduction to Web Security

(3 L)

Overview of Web Security and its role, Understanding Network Security, Threat Surfaces, and Threat Landscape.

Ref-1: Chapter-1

Chapter-2: Web Basics

(3 L)

HTML, CSS, JavaScript, URLs, DOM, Frames, HTTP, DNS, Navigation, X-Domain communication, Network Attacks & HTTPS, Limitations of HTTPS.

Ref-2: Chapter-2, pp 27-45

Chapter-3: Network Security

(6 L)

Security Issues in TCP/IP – TCP, DNS, Routing (Topics such as basic problems of security in TCP/IP, IPsec, BGP Security, DNS Cache poisoning, etc.), DNSSec, IPSEC, S-BGP, Threat Models, Denial of Service Attacks, DOS-proof network architecture, Wireless-LAN Security – WEP, WPA, WPA2, and WPA3, Network Defense tools – Firewalls, Intrusion Detection, Filtering.

Ref-1: Chapter-7

Module-2

[12L+3T]

Chapter-4: Client-side Attacks and Defenses

(4 L)

Cookies and Sessions, Session attacks, Cross-Site Request Forgery, Cross-Site Scripting (XSS), Cross-Site Scripting Defenses, Online Tracking, What Can Be Done About it, and Who's Doing it.

Ref-2: Chapter-22,23, pp 235- 252

Chapter-5: Server-side Attacks and Defenses

(3 L)

Server-side attacks and defenses, Server security, Safe coding practices, HTTPS and the Lock Icon, HTTPS in the Real World, Authentication, WebAuthn - The future of user authentication on the web.

Ref-2: Chapter-16

Chapter-6: Web Security in the Real World

(5 L)

Local HTTP server security, The Security Architecture of the Chromium Browser, Cross-Origin Read Blocking (CORB) primer, Cross-Origin Read Blocking (CORB) explainer, DNS rebinding attacks, Protecting Browsers from DNS Rebinding Attacks, Private Network Access, Browser architecture, writing secure code.

Ref-1: *Chapter-19*

References:

1. Web Security, Privacy & Commerce, 2nd Edition.
2. Web Application Security: Exploitation and Countermeasures for Modern Web Applications, 2nd Edition by Andrew Hoffman.

Course Outcomes (CO): SDMAT-243: Web Security

CO-1: Understand and discover security vulnerabilities in browser-side security threats.

CO-2: Understand and discover vulnerabilities in server-side security threats.

CO-3: Gain hands-on experience with web programming and critically audit web applications for security flaws.

CO-4: Understand and discover mitigation techniques to reduce the risk of cyber-attacks on web applications.

CO-5: Understand and discover security vulnerabilities in Wireless LAN and defense mechanisms against such vulnerabilities.

CO-6: Understand and discover security vulnerabilities in Networked Systems, Protocols, and the Internet.

Semester-III, Subject-I, Practical Paper-4

SDMAP-243: Advanced Java Lab

[Practical, 2 Credits Paper, 60 L]

List of Experiments:

1. Assignment to demonstrate methods to create threads using the Thread class or Runnable interface.
2. Assignment to demonstrate managing thread priorities and using synchronization to avoid concurrency issues.
3. Assignment to demonstrate establishing a connection with a database using DriverManager or DataSource.
4. Assignment to demonstrate how to perform operations like INSERT, UPDATE, DELETE, and SELECT using JDBC.
5. Assignment to demonstrate graphics Programming using Swing
6. Assignment to demonstrate Life cycle methods of an applet
7. Assignment to demonstrate mechanisms for tracking user sessions in a web application (cookies, URL rewriting, session objects).
8. Assignment to demonstrate the concept of invoking methods on objects residing on remote systems.
9. Assignment to demonstrate creating a basic JSP application that handles user input and displays results.
10. Assignment to demonstrate tools provided by Sun Microsystems to develop and test JavaBeans.
11. Assignment to demonstrate Implementation of list, Set, ArrayList in Collection

Course Outcomes (CO)

CO-1: Students will be able to Create, manage, and synchronize threads to design efficient, concurrent applications in Java.

CO-2: Students will be able to Establish database connections and perform SQL operations

CO-3: Students will be able to Create and manage Java applets, understanding their lifecycle methods and integrating them into HTML pages.

CO-4: Students will be able to Develop dynamic web applications using Servlets and JSP

Semester-III, Subject-II, Theory Paper-5

ESMAT-231: .Net Framework

[Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Introduction to ASP.NET	3
	Coding Standards	3
	ASP.NET Standard Controls	6
II	ASP.NET Validation Controls	4
	Designing Websites with Master Pages	4
	Using the Rich Controls	2
	ADO.NET	2

Module-1

[12L+3T]

Chapter-1: Introduction to ASP.NET

[3 L]

Server and Client-Side Programming, The Common Language Runtime (CLR), Visual Studio Overview, Characteristics of ASP.NET

Ref 3: Chapter-32 pp 1364 to 1372 **Ref 2:** Chapter-1,2,3 pp 1 to 47

Chapter-2: Coding Standards

[3 L]

Overview of coding standards in .NET programming, Best practices for maintainability and performance

Ref 2: Chapter-5 pp 121 to 160

Chapter-3: ASP.NET Standard Controls

[6 L]

Displaying information (Label Controls, Literal Controls, Bulleted List), Accepting User Input (Textbox, RadioButton, CheckBox, Button, LinkButton, ImageButton, DropDownList, ListBox), Displaying Images (Image Control, Image Map Control, Panel Control, Hyperlink Control)

Ref 2: Chapter-6 pp 163 to 200

Module-2

[12L+3T]

Chapter-4: ASP.NET Validation Controls

[4 L]

Required Field Validator, Regular Expression Validator, Compare Validator, Range Validator, Validation Summary, Custom Validator

Ref 2: Chapter-9 pp 271 to 292

Chapter-5: Designing Websites with Master Pages

[4 L]

Creating master pages and default contents, Nesting master pages

Ref 2: Chapter-12 pp 370 to 386

Chapter-6: Using the Rich Controls

[2 L]

Accepting File Uploads, Saving files to the file system, Working with Calendar Control

Ref 2: Chapter-10 pp 293 to 318

Chapter-7: ADO.NET

[2 L]

Introduction to ADO.NET, Connection Strings and Database Connectivity

Ref 2: Chapter-14 pp 425 to 472

Reference Books:

1. Stephen Walther - ASP.NET 3.5 Unleashed
2. Matthew MacDonald - Beginning ASP.NET 4.5 in C#
3. Dino Esposito - Microsoft ASP.NET and AJAX: Architecting Web Applications

Course Outcomes (CO)

At the end of this course, students will be able to:

- CO 1: Develop dynamic web pages using ASP.NET.
- CO 2: Implement user interfaces using standard web server controls.
- CO 3: Create user controls and custom server controls for ASP.NET pages.
- CO 4: Design websites using master pages and themes.
- CO 5: Identify and fix bugs in ASP.NET applications.
- CO 6: Display and manage dynamic data using ADO.NET and data binding.
- CO 7: Integrate web services to enhance ASP.NET applications.
- CO 8: Deploy ASP.NET applications to production web servers.

Semester-III, Subject-II, Practical Paper-3

ESMAP-232: .Net Framework Lab

[Practical, 2 Credits Paper, 60 L]

List of Experiments:

1. Assignment to demonstrate installation of .NET framework
2. Assignment to demonstrate introduction to .NET framework.
3. Assignment to demonstrate application using controls label, textbox and button.
4. Assignment to demonstrate application using controls radio button and radio button list controls.
5. Assignment to demonstrate application using controls checkbox and checkboxlist.
6. Assignment to demonstrate application using controls linkbutton, imgbutton, and hyperlink.
7. Assignment to demonstrate application using controls dropdownlist and listbox.
8. Assignments to demonstrate application to display image using image control and image map control.
9. Assignments to demonstrate application to display image using panel control and hyperlink control.
10. Assignment to demonstrate application using validation control (Required field validator control, regular expression validator control, compare field validator control).
11. Assignment to demonstrate application using validation control (Range validator control, validation summary control).
12. Assignment to demonstrate application using file upload.
13. Assignment to demonstrate application using Master Pages.

Course Outcomes (CO)

CO-1: Students will be able to design web applications using ASP.NET

CO-2: Students will be able to use ASP.NET controls in web applications

CO-3: Students will be able to create database driven ASP.NET web applications and web services

Semester-IV, Subject-II, Theory Paper-6

ESMAT-241: MVC Framework

[Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Introduction to ASP.NET MVC	3
	Using the Razor View Engine	3
	View Techniques	3
	Implementing Navigation in MVC Web Apps	3
II	MVC State Management and Additional Techniques	3
	Using AJAX and jQuery with ASP.NET MVC	3
	ASP.NET MVC & LINQ - Working with Data	3
	ASP.NET Web API with MVC	3

Module-1

[12L+3T]

Chapter-1: Introduction to ASP.NET MVC

(3 L)

The role of the Model, View, and Controller, Key benefits of ASP.NET MVC, Naming conventions, creating views, defining controllers, Defining a data model, Data validation.

Ref 3: Chapter-32 pp 1364 to 1372

Chapter-2: Using the Razor View Engine

(3 L)

Getting started with Razor, Razor design goals, implementing a Razor, Razor syntax, Accessing Model Data in Razor views, Implementing a Repository and Entity Framework Data Model, Using Dependency Injection, Implementing a custom controller factory.

Ref-3: Chapter-2, pp 44 to 65

Chapter-3: View Techniques

(3 L)

Defining and using custom HTML Helpers, defining a layout / MVC Master Page, Using Styles, Defining and using partial views, Razor Helper Method syntax.

Ref-3: Chapter-2, pp 44 to 65

Chapter-4: Implementing Navigation in MVC Web Apps

(3 L)

Defining view-model classes, Implementing Data Filtering in a Controller, Understanding the Routing mechanism, adding custom entries to a route table, Defining defaults, parameters, and validation, Generating URLs and Hyperlinks, Custom Route constraints.

Ref-3: Chapter-32, pp 1363 to 1396

Module-2

[12L+3T]

Chapter-5: MVC State Management and Additional Techniques

(3 L)

Using hidden fields, Session and Application State, Custom model bindings, View Scaffold Templates, Controller Scaffold Templates, Global Filters, Model binding, Asynchronous Controllers.

Ref-1: Chapter-8, pp 144 to 165

Chapter-6: Using AJAX and jQuery with ASP.NET MVC

(3 L)

Overview of AJAX and ASP.NET MVC, Unobtrusive AJAX, Using AJAX Action Links, Overview of jQuery, jQuery Techniques, Using jQuery UI.

Ref-1: Chapter-10,11 pp 138 to 165,170 to381

Chapter-7: ASP.NET MVC & LINQ - Working with Data

(3 L)

Language features used in LINQ, creating simple LINQ queries, Using LINQ queries in a Web application, defining a data repository, Using LINQ to define a data access component, View scaffold templates, Controller scaffold templates.

Ref-1: Chapter14 pp 486 to 535

Chapter-8: ASP.NET Web API with MVC

(3 L)

Overview of the ASP.NET Web API, Building servers and clients, Content negotiation, Validation, Queryable Interfaces, Dependency Injection.

Ref-1: Chapter-11, pp 393 to 399

References:

1. Beginning ASP.NET 4.5: in C# and VB by Imar Spaanjaars.
2. Pro ASP.NET 4 in C# 2010 by Matthew MacDonald.

Course Outcomes (CO): SDMAT-241: MVC Framework

CO-1: Understand the benefits of MVC design over traditional ASP.NET Web Forms.

CO-2: Apply the validation framework for both client and server validations.

CO-3: Explain the role of Model, View, and Controller.

CO-4: Develop a complete web application.

CO-5: Use view models for validations.

Semester-IV, Subject-II, Theory Paper-4

ESMAP-242: MVC Framework Lab

[Practical, 2 Credits Paper, 60 L]

List of Experiments:

1. Assignment on Simple ASP.Net MVC Application
2. Assignment on Tight coupling in MVC
3. Assignment on Razor view engine in MVC (For Loop, Foreach loop) in ASP.NET MVC
4. Assignment on custom HTML helpers in ASP.Net MVC
5. Assignment on send data from controller to view (ViewBag, TempData, ViewData) in ASP.NET MVC
6. Assignment on Master page in ASP.NET MVC
7. Assignment on partial view in ASP.NET MVC
8. Assignment on State Management in ASP.NET MVC
9. Assignment on View Model in ASP.NET MVC
10. Assignment on Hyperlink in ASP.NET MVC
11. Assignment on Validation (Data Annotation) in ASP.NET MVC
12. Assignment on Master page in ASP.NET MVC

Course Outcomes:

CO-1: Students will understand the core concepts of the MVC framework, including the roles and responsibilities of Model, View, and Controller components in an application.

CO-2: Students will understand and apply routing mechanisms in an MVC framework to map URLs to controllers and actions.

CO-3: Students will develop the ability to test and debug MVC applications effectively.

Vocational Skill Course(VSC), Sem-III
SDVST-231: Web Graphics and UI Design
[Theory, 2 Credits Paper, 30 L]

Module	Chapter No	No. of lecture
I	Basics of Web Graphics	6 L
	Fundamentals of UI Design	6 L
II	Tools and Techniques for Web Graphics	6 L
	Trends and Case Studies in UI Design	6 L

Module-1

[12L+3T]

Chapter-1: Basics of Web Graphics

[6 L]

Introduction to web graphics: Purpose and applications. Raster and vector graphics.

Color theory: RGB, CMYK, color harmony, and contrast. Typography: Fonts, readability, and hierarchy.

Ref-1: pp 25-40, pp 70-85, pp 100-115, pp. 320-340

Chapter-2 :Fundamentals of UI Design

[6 L]

Introduction to UI design: Definitions and role in UX.

Principles: Simplicity, consistency, feedback, and user-centered design.

Standards: Google Material Design, Apple Human Interface Guidelines.

Ref-2: pp 3-20, pp 55-75, pp. 220-250,

Module-2

[12L+3T]

Chapter-3: Tools and Techniques for Web Graphics

[6 L]

Introduction to Design Tools: Adobe Photoshop, Figma, Canva

Basics of Image Editing: Cropping, Resizing, and Filters

Creating Wireframes and Prototypes: Low-Fidelity and High-Fidelity Examples

Responsive Design Principles: Media Queries and Fluid Grids

Ref-3: pp 15-30, 45-60, 85-100

Ref-1: pp 320-340

Chapter-4: Trends and Case Studies in UI Design

[6 L]

Modern UI Trends: Minimalism, Neumorphism, and Dark Mode

Case Studies of Popular UIs: Google, Airbnb, and Netflix

Evaluating and Improving UI Designs

Future of UI Design: AI and Augmented Reality

Ref-4: pp 12, 15, 22, 25, 30, 33, 40, 45, 50, 60, 65, 70, 75

Reference-1: “Learning Web Design, Fourth Edition” by Jennifer Niederst Robbins, **Source:** Learning Web Design, Fourth Edition

Reference-2: “The Essential Guide to User Interface Design” by Wilbert O. Galitz, **Source:** [The Essential Guide to User Interface Design](#)

Reference-3: “Graphics and Webpage Design” **Source:** Graphics and Webpage Design

Course Outcomes (CO)

- CO-1: Understand the theoretical foundations of web graphics and UI design.
- CO-2: Apply design principles to evaluate the effectiveness of web interfaces.
- CO-3: Appreciate the role of accessibility and usability in modern web design.
- CO-4: Gain insights into future trends and evolving standards in UI design.

(Vocational Skill Course) SEM-IV

SDVSP-241: Mini Project-I

List of Experiments:

1. Project Planning and Analysis
2. Designing the Project Structure
3. Implementing Core Functionality
4. User Interface Design and Development-I
5. User Interface Design and Development-II
6. User Interface Design and Development-III
7. Data Handling and Storage-I
8. Data Handling and Storage-II
9. Testing and Quality Assurance
10. Documentation-I
11. Documentation-II

Course Outcome:

CO-1: Student will be able to explain the principles and functionalities of Programming Languages and its role in web development.

CO-2: Student will be able to summarize the process of handling user input and form submissions.

CO-3: Student will be able to apply programming concepts and techniques to integrate databases and perform CRUD operations (create, read, update, delete) on data

CO-4 : Student will be able to evaluate the efficiency and effectiveness of different programming approaches in web application development.

CO-5 : Student will be able to design and develop a comprehensive project from scratch, integrating various features like user authentication, data validation, and database interactions.

CO- 6: Student will be able to innovate and implement advanced functionalities using frameworks and libraries.

Project Guidelines

Part-I: Government of Maharashtra Guidelines

Ref: <https://dhepune.gov.in/wp-content/uploads/2017/01/RPT-20221020-Dr-R-D-Kulkarni-Committee-Report-1.pdf> (Kulkarni Committee report 04-11-2022)

Community Engagement and Field Projects

The field-based learning/project should attempt to provide opportunities for students to understand the different socio-economic contexts. It should aim at giving students exposure to development-related issues in rural and urban settings. It will provide opportunities for students to observe situation in rural and urban contexts, and to observe and study actual field situations regarding issues related to socio-economic development. Students should be given opportunities to gain a first-hand understanding of the policies, regulations, organizational structures, processes, and programmes that guide the development process. They should have opportunity to gain an understanding of the complex socio-economic problems in the community, and innovative practices required to generate solutions to the identified problems.

The curricular component of 'community engagement and service' seeks to expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems. This component will include participation in activities related to National Service Scheme (NSS), National Cadet Corps (NCC), adult education/literacy initiatives and mentoring school students.

A minimum of 4-6 weeks of summer work, either on university campus in activities related to preservation of environment/biodiversity or community-based work in the neighboring community (through NSS unit) or field-level work with a recognized NGO or regional case studies programme at Villages may be undertaken as a part of Field projects.

As per UGC guidelines, Regional Case Study Course or Social Entrepreneurship Course, with 02 Credits, can be floated an optional mode or as add-on-credit with total duration of 30 hours. At least 50% of the course is to be done compulsorily in the field for all students.

SDFPP-231: Field Project-I

College Guidelines

- **Practical Based:** Field projects involve going out into the real world (on the field), collecting data and samples on specified problem, tabulating and analysing data and conducting experiments on field or in laboratory on collected samples, obtaining conclusions, compiling project.

OR

- **Survey Based:** Field projects involve going out into the real world (on the field), collecting data, tabulating and analysing data, obtain conclusions from data, compiling project.

OR

- **Analysing and solving problem type:** Understand the problem, solving problem and implementing solutions to actual problems faced by communities or organizations.

GUIDELINE TO CARRY OUT FIELD PROJECT WORK

1. **Duration of Project work:** - One semester, minimum 60 hours field and laboratory work. At least 1 sessions of 4 hours should be allotted to each students.
2. Department should allot project guide (mentor) to each student. *Each student should be allotted separate project or may be given in small team. In case of project in team, each student should work on different aspect of the problem, data should be collected independently, then put together collected data and analyse it. Draw the conclusions. Project should be presented by team and each student should represent different aspect of project. As project is performed in team, there should sufficiently large data collected by the team.*
3. **Choice of Research Problem and Workout:** Student should select appropriate problem to the field project work with the help of his mentor. Project problem should be related to the major subject or it may be inter-dispersary. Outline should be prepared by student with the help of mentor to perform and complete field project within stipulated time.
4. **Internal Evaluation and Schedule for Submission of Project Work:**
 - a. Field work and related laboratory work must be completed by a student within 12 weeks from the commencement of the IIIrd semester.
 - b. Internal evaluation will be performed by mentor and one internal examiner when project is near to completion (10th week of semester).
 - c. Hard copy of the project work (two copies) should be submitted to department at the end of semester (15th week after commencement of IIIrd semester).

Format for submission of project report-

The hard copy of project should contain about 25-30 pages (*A₄ size paper, 1 inch margin from all sides, font - Times New Roman, Font size – 12 pt, line spacing 1.5*). Should be divided into the following parts:

- a. Title page

- b. Certificate of completion of Project Work from mentor and HOD.
- c. Declaration by candidate regarding plagiarism
- d. Index
- e. Abstract of the project
- f. **Chapter-1:** Introduction to problem (introduction, signification of research problems selected, aims and objectives) **(5 to 6 pages)**
- g. **Chapter-2:** Review of Literature (Related Research Problem) **(5-6 pages)**
- h. **Chapter-3:** Material and Methods/Methodology/Experimental **(5-7 pages)**
- i. **Chapter-4:** Results and Discussion or Data and Interpretation of data **(8 – 10 pages)**
- k. **Chapter-5:** Conclusions **(1-2 pages)**
- l. Bibliography/References/webliography
- m. Acknowledgement

Few Examples field projects

Science

1. Monitor local water quality and assess pollution sources.
2. Analyse plant diversity and its impact on soil health.
3. Conduct surveys to understand human-wildlife interactions.
4. Track climate change effects on specific ecosystems.
5. Develop sustainable waste management solutions for rural communities.

Social Sciences

6. Assess access to education and propose improvements in underprivileged areas.
7. Document cultural traditions and practices facing preservation challenges.
8. Analyse the impact of social media on mental health in specific communities.
9. Evaluate the effectiveness of government programs for poverty reduction.
10. Explore economic opportunities and challenges in developing regions.

Business & Technology

11. Research consumer preferences and behaviours in emerging markets.
12. Analyse the impact of new technologies on specific industries or communities.
13. Develop digital solutions to improve healthcare access in underserved areas.
14. Assess the effectiveness of marketing campaigns for local businesses.
15. Evaluate the feasibility of renewable energy implementation in specific regions.

Arts & Humanities

16. Create public art installations that address social issues.
17. Conduct oral history interviews to document personal experiences.
18. Preserve and restore historical landmarks or cultural artifact's.
19. Develop educational programs using local arts and heritage.
20. Analyse the impact of globalization on cultural identity.

Ref: <https://statanalytica.com/blog/field-project-topics/>

Indian Knowledge System Semester-III,
SDIKT-231: Indian Number System
[2 Credits, 30 L]

Module	Chapter No	No. of lecture
I	Introduction to Indian Numerical Systems	1
	Decimal Number System: Indian and International Perspectives	2
	Binary Number System and its Indian Origins	3
	Place Value System and Positional Notation	3
	Arithmetical Operations in Indian Number Systems	3
II	Calculation Techniques in Indian Mathematics	2
	Numerical Notation Systems: Beyond Decimal and Binary	2
	Historical Development and Influence of Indian Numerical Systems	4
	Applications of Indian Numerical Systems in Computing	4

Module-1

[12L+3T]

Chapter-1: Introduction to Indian Numerical Systems

[1 L]

Overview of ancient Indian numeral systems (e.g., decimal, binary, and positional systems), Exploration of the unique features and principles of Indian number systems, Understanding the historical and cultural significance of Indian numeral systems

Ref-1 pp 1 to 25

Chapter-2: Decimal Number System: Indian and International Perspectives

[2 L]

Study of the Indian decimal numeral system (e.g., place value, number names), Comparative analysis of the Indian decimal system with other international numeral systems (e.g., Arabic, Roman), Conversion between Indian and international numeral systems

Ref-1 pp 56 to 80

Chapter-3: Binary Number System and its Indian Origins

[3 L]

Introduction to the Indian origins of the binary numeral system, Study of binary representation, arithmetic operations, and conversions, Application of the binary system in computer science and digital computation

Ref-5 pp 112 to 189

Chapter-4: Place Value System and Positional Notation

[3 L]

Exploration of the concept of place value and positional notation in Indian numeral systems, Study of the significance and benefits of place value representation, Application of place value and positional notation in numerical calculations and algorithms

Ref-3 pp 40 to 96

Chapter-5: Arithmetical Operations in Indian Number Systems

[3 L]

Analysis of arithmetic operations (addition, subtraction, multiplication, division) in Indian numeral systems, Study of ancient Indian algorithms and computational techniques for arithmetic operations, Application of Indian arithmetic methods in solving numerical problems

Ref-1 pp 210 to 226

Module-2

[12L+3T]

Chapter-6: Calculation Techniques in Indian Mathematics

[2 L]

Exploration of mental calculation techniques from ancient Indian texts (e.g., Vedic Mathematics), Study of fast and efficient methods for addition, subtraction, multiplication, and division, Application of Indian calculation techniques in problem-solving and algorithmic optimization

Ref-3 pp 32 to 69

Chapter-7: Numerical Notation Systems: Beyond Decimal and Binary

[2 L]

Introduction to other Indian numeral systems (e.g., Katapayadi, Mayan, Brahmi), Comparative analysis of these numeral systems with decimal and binary systems, Exploration of the unique features and applications of alternative numeral systems

Ref-5 pp 220 to 340

Chapter-8: Historical Development and Influence of Indian Numerical Systems

[4 L]

Overview of the historical development and evolution of Indian numeral systems, Examination of the influence of Indian numeral systems on mathematics, science, and computation worldwide, Discussion on the contributions of ancient Indian mathematicians to numerical notations and computation

Ref-3 pp 80 to 112

Chapter-9: Applications of Indian Numerical Systems in Computing

[4 L]

Analysis of the application of Indian numeral systems in modern computing (e.g., computer architecture, data representation), Exploration of the benefits and challenges of using Indian numerical systems in computational contexts

Ref2- pp 60 to 156

Reference-1: "History of Indian Mathematics: A Source Book" by C. K. Raju, Publication: Pearson Education (2007)

Reference-2: Indian Mathematics: Engaging with the World from Ancient to Modern Times" by Snezana Lawrence and Dominic Klyve, Publication: World Scientific Publishing Company

Reference-3: “History of Indian Mathematics: A Source Book” by C. K. Raju, Publication: Pearson Education (2007)

Reference-3: “Mathematics in India” by Kim Plofker, Publication: Princeton University Press

Reference-4: “Computers, Mathematics Education, and the Alternative Calculus Story: A Guest Edited Collection” edited by Gert Schubring and Brendan Larvor, Publication: Springer

Course Outcome

At the end of course, student will able -

CO-1: Explain the concepts of decimal, binary, and positional systems in Indian numerals.

CO-2: Apply the principles of Indian numeral systems to solve basic numerical problems.

CO-3: Apply the binary system to perform arithmetic operations and conversions.

CO-4: Compare and contrast various Indian numeral systems, including Katapayadi, Mayan, and Brahmi, with the decimal and binary systems, analyzing their unique features and applications.

CO-5: Understand the algorithms and techniques used in Indian numeral systems for arithmetic operations.

CO-6: Analyze the application of Indian numeral systems in modern computing, such as computer architecture and data representation, highlighting their benefits and potential challenges.

Community Engagement Program(CEP) Sem-IV, SDCEP-241-Community Engagement Project

Community Engagement Project Guidelines

Part-I: Government of Maharashtra Guidelines

Ref: <https://dhepune.gov.in/wp-content/uploads/2017/01/RPT-20221020-Dr-R-D-Kulkarni-Committee-Report-1.pdf> (Kulkarni Committee report 04-11-2022)

Community Engagement and Field Projects

The field-based learning/project should attempt to provide opportunities for students to understand the different socio-economic contexts. It should aim at giving students exposure to development-related issues in rural and urban settings. It will provide opportunities for students to observe situation in rural and urban contexts, and to observe and study actual field situations regarding issues related to socio-economic development. Students should be given opportunities to gain a first-hand understanding of the policies, regulations, organizational structures, processes, and programmes that guide the development process. They should have opportunity to gain an understanding of the complex socio-economic problems in the community, and innovative practices required to generate solutions to the identified problems.

The curricular component of 'community engagement and service' seeks to expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems. This component will include participation in activities related to National Service Scheme (NSS), National Cadet Corps (NCC), adult education/literacy initiatives and mentoring school students.

A minimum of 4-6 weeks of summer work, either on university campus in activities related to preservation of environment/biodiversity or community-based work in the neighboring community (through NSS unit) or field-level work with a recognized NGO or regional case studies programme at Villages may be undertaken as a part of Field projects.

As per UGC guidelines, Regional Case Study Course or Social Entrepreneurship Course, with 02 Credits, can be floated an optional mode or as add-on-credit with total duration of 30 hours. At least 50% of the course is to be done compulsorily in the field for all students.

c) **Study Tours:**

The NEP 2020 (Section 22.12.) recognizes that the knowledge of the rich diversity of India should be imbibed first hand by learners. This would mean including simple activities, like touring by students to different parts of the country, which will not only give a boost to tourism but will also lead to an understanding and appreciation of diversity, culture, traditions and knowledge of different parts of India. HEIs can plan study tours under 'Ek Bharat Shrestha Bharat' concept and send students to visit various important destinations and study their history, scientific contributions, traditions, indigenous literature and knowledge, etc., as a part of augmenting their knowledge about our country.

SDCEP-241: Community Engagement Project

Community Engagement is...the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people. It is a powerful vehicle for bringing about environmental and behavioural changes that will improve the health of the community and its members. It often involves partnerships and coalitions that help mobilize resources and influence systems, change relationships among partners, and serve as catalysts for changing policies, programs, and practices.

At its most basic level, community engagement is striving towards improving the quality of life in a community through both political and non-political means. Community engagement is also commonly referred to as civic engagement or public participation, and all terms reference a desire to make a positive difference in one's community that manifests itself through action, combining knowledge, skills, values, and motivation.

The answer to "what is community engagement?" includes activism, volunteer work, such as community gardening, tutoring, , environment protection, socio-economic survey, . There are virtually limitless forms of community engagement. Some of the different forms of community engagement include:

- Maintaining a community garden
- Survey of peoples on their views on donating blood, promoting them for blood donation, etc.
- Helping to local farmers a) to set vermiculture b) organic farming c) water management
- Survey on waste generated in housing society and advocating to society for waste management.
- Psychological health survey of a) Primary school students b) School students c) House women's d) working women's, etc. and its analysis.
- Studying cultural, economic, regional diversity in housing society and its impact on social behaviour in society.
- Food quality survey in particular category of peoples (slum area, economically backward peoples, etc) its analysis and feedback.
- Nutritional Survey in society and its analysis.
- Water quality survey in a village and its analysis.
- Electricity utilization survey, its analysis and majors to minimize its utilization.
- Mobile screen time survey and analysis and majors to minimize mobile screen time.
- Survey on mobile addiction in school, college students and majors to minimize it.

- Survey on secure use of money transfer apps, e-purchase, e-banking, analysing problems of peoples and solution on it.
- Survey on health of girls in school and colleges, its analysis and feedback.ssSurvey on gender sensitization, gender equality, its analysis and feedback.
- Survey on helpless peoples for their health, shelter, food, etc. problems, it analysis and feedback.
- Survey on awareness of college students of backward classes on awareness of government scheme for then, its analysis and feedback.

GUIDELINE TO CARRY OUT COMMUNITY ENGAGEMENT PROJECT WORK

1. **Duration of Project work:** - One semester, minimum 60 hours field and laboratory work. At least 1 sessions of 4 hours per week should be allotted a students for 15 weeks.
 2. Department should allot project guide (mentor) to each student. CEP can be assigned to individual student or in a group to 2 to 4 students.
 3. **Choice of Research Problem and Workout:** Student/s should select appropriate problem for the community engagement project with the help of his/their mentor. Project problem should be related to the major subject or it may be inter-dispensary. Outline should be prepared by student with the help of mentor to perform and complete community engagement project within stipulated time.
 4. **Type of work expected:** a) Selection of topic b) Preparation of background for project work, c) preparation of questionnaire for survey d) selection of area / category of people / places / for survey e) Collection of feedback of peoples through questionnaire d) Analysis feedback of peoples e) Identification of problems and its severe ness f) Your solution on problem and feed to peoples. g) Compiling project
- **Internal Evaluation and Schedule for Submission of Project Work:**
 1. Field work and related laboratory work must be completed by a student within 12 weeks from the commencement of the IIIrd semester.
 2. Internal evaluation will be performed by mentor and one internal examiner when project is near to completion (10th week of semester).
 3. Hard copy of the project work (two copies) should be submitted to department at the end of semester (15th week after commencement of IIIrd semester).

for submission of project report-

- The hard copy of project should contain about 25-30 pages (*A₄ size paper, 1 inch margin from all sides, font - Times New Roman, Font size – 12 pt, line spacing 1.5*). Should be divided into the following parts:
 - Title page
 - Certificate of completion of Project Work from mentor and HOD.
 - Declaration by candidate regarding plagiarism
 - Index
 - Abstract of the project
- Chapter-1:** Introduction to problem (introduction, signification of problems selected, aims and objectives) (5 to 6 pages)

Chapter-2: Review of Literature (Related Research Problem) (5-6 pages)

Chapter-3: Material and Methods/Methodology/Experimental (5-7 pages)

Chapter-4: Data analysis and Interpretation of data (8 – 10 pages)

Chapter-5: Feed back given to peoples / society /government agency / NGO, etc and Conclusions (1-2 pages).

2. Bibliography / References / webliography

Evaluation of Project

- | | |
|----------------------------|----------|
| • Certified Project Report | 10 marks |
| • Presentation | 15 Marks |
| • Viva Voce on Project | 10 Marks |

(Skill Enhancement Course) SEM-IV

SDSEP-241: Mini Project-II

List of Experiments:

1. Project Planning and Analysis
2. Designing the Project Structure
3. Implementing Core Functionality
4. User Interface Design and Development-I
5. User Interface Design and Development-II
6. User Interface Design and Development-III
7. Data Handling and Storage-I
8. Data Handling and Storage-II
9. Testing and Quality Assurance
10. Documentation-I
11. Documentation-II

Course Outcome:

CO-1: Student will be able to explain the principles and functionalities of Programming Languages and its role in web development.

CO-2: Student will be able to summarize the process of handling user input and form submissions.

CO-3: Student will be able to apply programming concepts and techniques to integrate databases and perform CRUD operations (create, read, update, delete) on data

CO-4 : Student will be able to evaluate the efficiency and effectiveness of different programming approaches in web application development.

CO-5 : Student will be able to design and develop a comprehensive project from scratch, integrating various features like user authentication, data validation, and database interactions.

CO- 6: Student will be able to innovate and implement advanced functionalities using frameworks and libraries.

ENAET-231: English Communication and Soft Skills-I
2 Credits, 30 L

Unit-1: Defining Soft Skills [10 L]

- i. Introduction to soft skills
- ii. Soft skills and hard skills
- iii. Enhancing soft skills
- iv. Significance of soft skills in today's globalized world

Unit-2: Motivation, Goal Setting and Self-Esteem [10 L]

- i. What is motivation?
- ii. Importance of goal setting
- iii. What is self-esteem?
- iv. The power of positive thinking

Unit-3: Time Management [10 L]

- i. Importance of time management
- ii. Avoiding procrastination
- iii. Developing priority-management skills
- iv. Strategies for managing time

Course Outcome- At the end of course the students will be able to -

CO-1: Define soft skills.

CO-2: Distinguish between soft skills and hard skills.

CO-3: Define motivation and understand the importance of goal setting.

CO-4: Analyse the concept of self-esteem.

CO-5: Examine the power of positive thinking.

CO-6: Develop strategies for managing time.

CO-7: Relate soft skills to real life.

Ability Enhancement Course, Semester-IV,
ENAET-241: English Communication and Soft Skills-II;
2 Credits, 30 L

Unit-1: Creative Thinking and Problem Solving [10 L]

- i. What is creative thinking?
- ii. Difference between critical and creative thinking
- iii. Importance of creative thinking in problem solving
- iv. Strategies for developing creative thinking for solving problems

Unit-2: Team Building [10 L]

- i. What is a team?
- ii. Strategies for resolving the interpersonal conflicts
- iii. Developing the interpersonal negotiation skills
- iv. Importance and significance of effective team building

Unit-3: Leadership [10 L]

- i. What are leadership skills?
- ii. Types of leadership
- iii. Developing leadership skills
- iv. Strategies for developing leadership

Course Outcome-

At the end of course the students will be able to -

- CO-1:** Distinguish between critical and creative thinking.
- CO-2:** Explore strategies for developing creative thinking for solving problems.
- CO-3:** Analyse the concept of self-esteem and apply it to real life.
- CO-4:** Examine the power of positive thinking.
- CO-5:** Develop interpersonal negotiation skills for resolving interpersonal conflicts.
- CO-6:** Identify different types of leadership and choose strategies for developing leadership.
- CO-7:** Apply soft skills to real life.

Co-Curricular Course (CC), Sem-III
CCHRT-231: Human Rights: An Introduction

1. Basic Concept **[8 L]**

- a) Human Values- Dignity, Liberty, Equality, Justice, Unity in Diversity, Ethics and Morals
- b) Meaning and significance of Human Rights Education

2. Perspectives of Rights and Duties **[7 L]**

- a) Rights: Inherent-Inalienable-Universal- Individual and Groups
- b) Nature and concept of Duties
- c) Interrelationship of Rights and Duties

3. Introduction to Terminology of Various Legal Instruments **[8 L]**

- a) Meaning of Legal Instrument- Binding Nature
- b) Types of Instruments: Covenant-Charter-Declaration-Treaty-Convention-Protocol-Executive Orders and Statutes

4. United Nations and Human Rights **[7 L]**

- a. Brief History of Human Rights- International and National Perspectives
- b. Provision of the charters of United Nations
- c. Universal Declaration of Human Rights- Significance-Preamble

References:

1. Donnelly, Jack. **Universal Human Rights in Theory and Practice**. Cornell University Press, 2013.
2. Nickel, James W. **Making Sense of Human Rights**. Wiley-Blackwell, 2007.
3. Clapham, Andrew. **Human Rights: A Very Short Introduction**. Oxford University Press, 2007.
4. Freeman, Michael. **Human Rights: An Interdisciplinary Approach**. Polity Press, 2017.
5. Ishay, Micheline R. **The History of Human Rights: From Ancient Times to the Globalization Era**. University of California Press, 2008.
6. Mertus, Julie A. **The United Nations and Human Rights: A Guide for a New Era**. Routledge, 2005.
7. Hunt, Lynn. **Inventing Human Rights: A History**. W.W. Norton & Company, 2008.
8. Goodhart, Michael, editor. **Human Rights: Politics and Practice**. Oxford University Press, 2013.
9. Moyn, Samuel. **The Last Utopia: Human Rights in History**. Harvard University Press, 2012.
10. Steiner, Henry J., Philip Alston, and Ryan Goodman. **International Human Rights in Context: Law, Politics, Morals**. Oxford University Press, 2007.

अ.न.	CCHRT-231: मानवी हक्क : परिचय (क्रेडिट: 2, 30 L)	
I	मूलभूत संकल्पना अ) मानवी मूल्ये- प्रतिष्ठा, स्वातंत्र्य, समानता, न्याय, विविधतेतील एकता, नैतिकता आणि नैतिकता ब) मानवी हक्क शिक्षणाचा अर्थ आणि महत्त्व	०८
II	अधिकार आणि कर्तव्यांचा दृष्टीकोन अ) हक्क: अंतर्निहित-अविभाज्य-सार्वत्रिक-वैयक्तिक आणि गट ब) कर्तव्याचे स्वरूप आणि संकल्पना क) हक्क आणि कर्तव्यांचा परस्परसंबंध	०७
III	विविध कायदेशीर साधनांच्या शब्दावलीचा परिचय अ) कायदेशीर साधनाचा अर्थ- बंधनकारक निसर्ग ब) साधनांचे प्रकार: करार-सनद-घोषणा-करार-कन्व्हेंशन-प्रोटोकॉल- कार्यकारी आदेश आणि कायदे	०८
IV	संयुक्त राष्ट्र आणि मानवाधिकार अ) मानवी हक्कांचा संक्षिप्त इतिहास- आंतरराष्ट्रीय आणि राष्ट्रीय दृष्टीकोन ब) संयुक्त राष्ट्रांच्या चार्टरची तरतूद क) मानवी हक्कांची सार्वत्रिक घोषणा- महत्त्व- प्रस्तावना	०७

Co-Curricular Course (CC), Sem-IV

CCCST-241: Cyber Security

Module-1:

Chapter 1: Overview of Networking Concepts

[7 L]

1. Basics of Communication Systems
2. Transmission Media
3. Topology and Types of Networks
4. TCP/IP Protocol Stacks
5. Wireless Networks
6. The Internet

Ref Book1 (chapter 1 page no 3 to 28 and 552 to 568)

Chapter 2: Information Security Concepts

[8 L]

1. Information Security Overview: Background and Current Scenario
2. Types of Attacks
3. Goals for Security
4. E-commerce Security
5. Computer Forensics
6. Steganography

Ref Book2 (chapter 1 page no 3 to 79)

Module-2:

Chapter 3: Security Threats and Vulnerabilities

[6 L]

1. Overview of Security threats
2. Weak / Strong Passwords and Password Cracking
3. Insecure Network connections
4. Malicious Code
5. Programming Bugs
6. Cyber-crime and Cyber terrorism
7. Information Warfare and Surveillance

Ref Book3

Chapter 4: Cryptography / Encryption

[9 L]

1. Introduction to Cryptography / Encryption
2. Digital Signatures
3. Public Key infrastructure
4. Applications of Cryptography
5. Tools and techniques of Cryptography

Ref Book1 (chapter 8 page no 766 onwards)

Reference Book:

Ref Book 1: Computer Networks By Andrew S. Tanenbaum, 5th Edition By Pearson Education

Ref Book 2: Network Security: A Beginner's Guide, 3rd Edition by Eric Maiwald

Ref Book 3: Handbook of Information Security: Threats, Vulnerabilities, Prevention, Detection, and Management, Volume 3 by Hossein Bidgoli, Wiley

Course Outcome:

CO1: Understand the concepts of networking and its type

CO2: Interpret the concepts of Information Security

CO3: Understand the concepts of Security Threats

CO4: Describe insecure Network Connections, Cyber Crime

CO5: Interpret the concepts of Basic Cryptography

CO6: Define the tools and techniques of Cryptography

GE/OE Basket for Science Students

Sem.-I

1. Basic Course in stock market
2. Entrepreneurial Skill Development-I
3. Indian Constitution and Political Process
4. Introduction to GIS
5. Psychology of adjustment and stress
6. Business Communication.
7. Corporate social responsibility

Sem.-II

1. Advance course in stock market
2. Entrepreneurial Skill Development-II
3. Practical on Indian Constitution and Political Process
4. Practical on GIS
5. Psychological Interpersonal Relationship
6. E-Commerce
7. Basics of hardware and networking

Question Paper Pattern

Marks: 35		Time: 2 Hour Cresits-02	
Instructions to the Candidate:			
1. All questions are compulsory.			
2. Figures to right indicate full marks.			
3. Use of Log table and scientific calculator is allowed.			
Question-1	Solve Any five of the following (Short Answers) i. ii. iii. iv. v. vi. vii.	Three def. type, two tricky questions and two questions problem type (if applicable)	5 Marks
Question-2	A. Solve any two of the following i. ii. iii.	Note or Describe type questions	6 Marks
	B. Solve the following Single question of four marks or two questions of 2 marks.	Problem type or tricky reasoning type question	4 marks
Question-3	A. Solve any two of the following i. ii. iii.	Write Note / Differentiate type questions	6 Marks
	B. Solve the following Single question of four marks or two questions of 2 marks.	Problem type or Derive equation or Tricky discussion type question	4 marks
Question-4	Solve Any four of the following i. ii. iii. iv. v.	Application type, Justification type question	10