

**DEPARTMENT OF INFORMATION  
TECHNOLOGY**

Dr. Shyama Prasad Mukherjee University



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**B.SC.  
INFORMATION  
TECHNOLOGY**

**4 Years Syllabus**





# **B.Sc. INFORMATION TECHNOLOGY**

## **4 Years Syllabus**



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## UNDER -GRADUATE AS PER NEP GUIDELINE

### DEPARTMENT OF INFORMATION TECHNOLOGY

### BOARD OF STUDIES

### FOREWORD

A Meeting of the BOARD OF STUDIES was held in the DEPARTMENT OF INFORMATION TECHNOLOGY, DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI on 22.07.2023. All members participated in the syllabus approval meeting. The Draft Syllabus for B.Sc.IT Programme was approved. It will be placed before the ACADEMIC COUNCIL of DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY for final approval.

#### 1. Internal Members:

##### Chairperson: -

**Dr. Ganesh Chandra Baskey**

Assistant Professor,  
Co-ordinator, Department of  
Information Technology, Dr. Shyama  
Prasad Mukherjee University, Ranchi

##### Members: -

**Dr. Rahul Deo Sah**

Assistant Professor  
Department of Information  
Technology Dr. Shyama Prasad  
Mukherjee University, Ranchi

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**Dr. Rajendra Kumar Mahto**

Assistant Professor  
Department of Information  
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22/07/2023

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**Mrs. Jyoti Bala**  
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**Dr. Priya Ranjan Priyadarshi**  
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**Mr. Syed Jaffar Abbas**  
Assistant Professor  
Department of Computer Application  
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**Dr. Dharam Raj Kumar**  
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**Dr. Ranjay Kumar**  
Assistant Professor  
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*Ranjay Kumar*  
22/7/23

## External Expert:

**Dr. Prakash Kumar**  
Assistant Professor  
Department of Computer Application  
Marwari College, Ranchi

*Dr. Prakash Kumar*  
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**Dr. Amardeep Kumar (HOD)**  
Assistant Professor  
Department of Computer Application  
Doranda College, Ranchi

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*Prakash*  
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*Amardeep*  
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*Ranjay*  
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## Implemented from Academic Session 2023-2027

<b>DR SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI</b> <b>DEPARTMENT OF INFORMATION TECHNOLOGY</b> <b>COURSE OF STRUCTURE FOR FOUR YEAR UNDERGRADUATE PROGRAMME 2023 ONWARDS</b> <b>SEMESTER WISE COURSE CODE AND MARKS FOR SINGLE MAJOR</b>			
SEMESTER	MAJOR		MARKS
	CODE	PAPERS	
I	MJ-101T	Computer Organization and IT Tools	75
	MJ-101P	Lab Based on Office Tools	25
II	MJ-201T	Programming in C	75
	MJ-201P	Lab Based on C Programming	25
	MJ-202T	Operating System	75
	MJ-202P	Lab Based on MS DOS	25
III	MJ-301T	Data Structure with C	75
	MJ-301P	Lab Based on Data Structure	25
	MJ-302T	Graph Theory	75
	MJ-302P	Lab Based on Graph Theory	25
IV	MJ-401T	Programming in C++	75
	MJ-401P	Lab Based on C++	25
	MJ-402T	Computer Network	75
	MJ-402P	Lab Based on Computer Configuration	25
	MJ-403T	Data base Management System	75
	MJ-403P	Lab Based on DBMS	25
V	MJ-501T	Programming in Java	75
	MJ-501P	Lab Based on Java	25
	MJ-502T	Object Oriented Modeling & Design	75
	MJ-502P	Lab Based on Object Oriented with UML	25
	MJ-503T	Web Technology	75
	MJ-503P	Lab Based on Web Technology	25
	INT-501P	Internship	100
VI	MJ-601T	Software Engineering	75
	MJ-601P	Lab Based on Software Engineering	25
	MJ-602T	Data Mining and Warehousing	75
	MJ-602P	Lab Based on Data Mining and Warehousing	25
	MJ-603T	Cyber Security	75
	MJ-603P	Lab Based on Cyber Security	25
	MJ-604T	PROJECT WORK	75
	MJ-604P	LAB BASED PROJECT WORK	25
VII	MJ-701T	Python Programming	75

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	MJ-701P	Lab Based on Python Programming	25
	MJ-702T	Computer Multimedia and Animation	75
	MJ-702P	Lab Based on Multimedia	25
	MJ-703T	Entrepreneurship Development	75
	MJ-703P	Lab Based on EDP	25
	MJ-704T	E-Commerce and Application	75
	MJ-704P	Lab Based on E-Commerce	25
VIII	MJ-801T	Digital image Processing	75
	MJ-801P	Lab Based on Digital Image Processing	25
	RC-801T	Research Methodology	100
	RC-802T	Research Proposal	100
	RC-803T	Research Report	100
		OR	
	MJ-801T	Artificial Intelligence	75
	MJ-801P	Lab Based on AI	25
	MJ-802T	Internet of Things	75
	MJ-802P	Lab Based on IOT	25
	MJ-803T	Cloud Computing	75
	MJ-803P	Lab Based on Cloud Computing	25

	Skill Enhancement Course (SEC)		
	CODE	PAPERS	MARKS
I	SEC-101T	Soft Skills	75
II	SEC-201T	Organizational Behaviour	75
III	SEC-301T	Management Information System	75

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## **Curriculum and Credit Framework for Undergraduate Programmes**

### **Introduction**

The National Education Policy (NEP) 2020 (hereafter referred to as NEP or Policy) recognizes that higher education plays an extremely important role in promoting human as well as societal well-being and in developing India as envisioned in its Constitution - a democratic, just, socially conscious, cultured, and humane nation upholding liberty, equality, fraternity, and justice for all. It notes that “given the 21st-century requirements, quality higher education must aim to develop good, thoughtful, well-rounded, and creative individuals”.

The NEP 2020 states, “*Assessments of educational approaches in undergraduate education that integrate the humanities and arts with Science, Technology, Engineering and Mathematics (STEM) have consistently shown positive learning outcomes, including increased creativity and innovation, critical thinking and higher-order thinking capacities, problem-solving abilities, teamwork, communication skills, more in-depth learning and mastery of curricula across fields, increases in social and moral awareness, etc., besides general engagement and enjoyment of learning*”

Further, it also recommends that “*the undergraduate degree will be of either 3 or 4-year duration, with multiple exit options within this period, with appropriate certifications, e.g., a UG certificate after completing 1 year in a discipline or field including vocational and professional areas, or a UG diploma after 2 years of study, or a Bachelor’s degree after a 3-year programme. The 4-year multidisciplinary Bachelor’s programme, however, shall be the preferred option since it allows the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student*”.

In accordance with the NEP 2020, the UGC has formulated a new student-centric “Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)” incorporating a flexible choice-based credit system, multidisciplinary approach, and multiple entry and exit options. This will facilitate students to pursue their career path by choosing the subject/field of their interest. The NEP highlights certain fundamental principles that would guide both the education system at large, as well as individual educational institutions. The principles that have a direct bearing on the curricula for different levels of higher education include:

- i. Recognizing, identifying, and fostering the unique capabilities of each student to promote her/his holistic development;
- ii. Flexibility, so that learners can select their learning trajectories and programmes, and thereby choose their own paths in life according to their talents and interests;

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- iii. Flexibility, so that learners can select their learning trajectories and programmes, and thereby choose their own paths in life according to their talents and interests;
- iv. Multidisciplinary and holistic education across the sciences, social sciences, arts, humanities, and sports for a multidisciplinary world;
- v. Emphasis on conceptual understanding rather than rote learning, critical thinking to encourage logical decision-making and innovation; ethics and human & constitutional values, and life skills such as communication, teamwork, leadership, and resilience;
- vi. Extensive use of technology in teaching and learning, removing language barriers, increasing access for *Divyang* students, and educational planning and management;
- vii. Respect for diversity and respect for the local context in all curricula, pedagogy, and policy;
- viii. Equity and inclusion as the cornerstone of all educational decisions to ensure that all students are able to thrive in the education system and the institutional environment are responsive to differences to ensure that high-quality education is available for all.
- ix. Rootedness and pride in India, and its rich, diverse, ancient, and modern culture, languages, knowledge systems, and traditions.

**The NEP envisages several transformative initiatives in higher education. These include:**

- Introducing holistic and multidisciplinary undergraduate education that would help develop all capacities of human beings - intellectual, aesthetic, social, physical, emotional, ethical, and moral - in an integrated manner; soft skills, such as complex problem solving, critical thinking, creative thinking, communication skills; and rigorous specialization in a chosen field (s) of learning.
- Adoption of flexible curricular structures in order to enable creative combinations of disciplinary areas for study in multidisciplinary contexts that would also allow flexibility in course options that would be on offer to students, in addition to rigorous specialization in a subject or subjects.
- Undergraduate degree programmes of either 3 or 4-year duration, with multiple entry and exit points and re-entry options, with appropriate certifications such as:
  - a UG certificate after completing 1 year (2 semesters) of study in the chosen fields of study,
  - a UG diploma after 2 years (4 semesters) of study,
  - a bachelor's degree after a 3-year (6 semesters) programme of study,

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- a 4-year bachelor's degree (honours) after eight semesters programme of study. If the student completes a rigorous research project in their major area(s) of study in the 4th year of a bachelor's degree (honours with research).
- The 4-year bachelor's degree programme is considered a preferred option since it would provide the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student.
- Inclusion of credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education.
- Environment education to include areas such as climate change, pollution, waste management, sanitation, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living.
- Value-based education to include the development of humanistic, ethical, Constitutional, and universal human values of truth, righteous conduct, peace, love, nonviolence, scientific temper, citizenship values, and life skills.
- Lessons in service and participation in community service programmes to be an integral part of holistic education.
- Global Citizenship Education and education for sustainable development to form an integral part of the curriculum to empower learners to become aware of and understand global and sustainable development issues and to become active promoters of more peaceful, tolerant, inclusive, secure, and sustainable societies.
- Students to be provided with opportunities for internships with local industry, businesses, artists, crafts persons, etc., as well as research internships with faculty and researchers at their own or other HEIs/research institutions, so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.
- Reorienting teaching programmes to ensure the development of capabilities across a range of disciplines including sciences, social sciences, arts, humanities, languages, as well as vocational subjects. This would involve offering programmes/courses of study relating to Languages, Literature, Music, Philosophy, Art, Dance, Theatre, Statistics, Pure and Applied Sciences, Sports, etc., and other such subjects needed for a multidisciplinary and stimulating learning environment.

Preparing professionals in cutting-edge areas that are fast gaining prominence, such as Artificial Intelligence (AI), 3-D machining, big data analysis, and machine learning, in addition to genomic studies, biotechnology, nanotechnology, neuroscience, with important applications

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to health, environment, and sustainable living that will be woven into undergraduate education for enhancing the employability of the youth.

## Curriculum Framework

### Main features of the New Curriculum Framework

The new curriculum framework will have the following features:

- I. Flexibility to move from one discipline of study to another;
- II. Opportunity for learners to choose the courses of their interest in all disciplines;
- III. Facilitating multiple entry and exit options with UG certificate/ UG diploma/ or degree depending upon the number of credits secured;
- IV. Flexibility for learners to move from one institution to another to enable them to have multi and/or interdisciplinary learning;
- V. Flexibility to switch to alternative modes of learning (offline, ODL, and Online learning, and hybrid modes of learning).

### Definitions, Eligibility, and Duration of the Programme

#### Semester/Credits:

- A semester comprises 90 working days and an academic year is divided into two semesters.
- A summer term is for eight weeks during summer vacation. Internship/apprenticeship/work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study. Regular courses may also be offered during the summer on a fast-track mode to enable students to do additional courses or complete backlogs in coursework. The HEIs can decide on the courses to be offered in the summer term depending on the availability of faculty and the number of students.

#### Major and Minor disciplines:

- **Major discipline** is the discipline or subject of main focus and the degree will be awarded in that discipline. Students should secure the prescribed number of credits (about 50% of total credits) through core courses in the major discipline.
- **Minor discipline** helps a student to gain a broader understanding beyond the major discipline. For example, if a student pursuing an Economics major obtains a minimum of 12 credits from a bunch of courses in Statistics, then the student will be awarded B.A. degree in Economics with a Minor in Statistics.

#### Awarding UG Certificate, UG Diploma, and Degrees:

- **UG Certificate:** Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year. These

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students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

- **UG Diploma:** Students who opt to exit after completion of the second year and have secured 80 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.
- **3-year UG Degree:** Students who wish to undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 120 credits and satisfying the minimum credit requirement as given in table 2 (Section 5).
- **4-year UG Degree (Honours):** A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 160 credits and have satisfied the credit requirements as given in table 2 in Section 5.
- **4-year UG Degree (Honours with Research):** Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a faculty member of the University/College. The research project/dissertation will be in the major discipline. The students who secure 160 credits, including 12 credits from a research project/dissertation, are awarded UG Degree (Honours with Research).
- **Internship:** A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

❖ **Students are advised to pursue the Internship Course in the following period:**

- I. Break between II & III Semester of one paper containing 4 Credits (Compulsory for all students) or
- II. Break between IV & V Semester of one paper containing 4 Credits (Compulsory for all students) or
- III. During V Semester of one paper containing 4 Credits (Compulsory for all students).

**SEE: ANNEXURE-NEP 2020**

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**SEMESTER- I**

**COURSE CODE : - MJ-101T**  
**COURSE TITLE : - Computer Organization and IT Tools**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

*Group-A: Objective questions (Compulsory)* : 2 X 10 = 20

*Group-B: short type questions (3 out of 5 questions)* : 3 X 5 = 15

*Group-C: Descriptive Type Questions (2 out of 4 questions)* : 12.5X2 = 25

*Total =* -----  
60

**Module 1:** Introduction to Computers -Hardware, software- System software, Application software, Utility software, Operating System; Computer Languages - Machine Level, Assembly Level & High-Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Introduction to Free and Open-Source Software, Definition of Computer Virus, Types of Viruses, Use of Antivirus software; Planning a Computer Program –Algorithm and Flowchart with Examples.

**Module 2:** Number System, Signed/Unsigned nos., 2's complement no's, Boolean algebra.

**Module 3:** Simplification of Boolean Expressions, Karnaugh Map. Logic Gates, Truth Tables

**Module 4:** Combinational Circuits- Half & Full Adders, Multiplexers, Demultiplexers, Encoders, Decoders.

**Module 5:** Sequential Circuits- JK, RS, T, D Flip Flop.

**Module 6:** Shift register, Synchronous and Asynchronous counters.

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**Module 7:** Microprocessor-simple Architecture of 8085 & 8086, DMA.

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Explain the merits and pitfalls in computer performance measurements and analyse the impact of instruction set architecture on cost-performance of computer design
2. Explain Digital Logic Circuits, Data Representation
3. Register and Processor level Design and Instruction Set architecture
4. Solve problems related to computer arithmetic and determine which hardware blocks and control lines are used for specific instructions
5. Explain memory organization,
6. I/O organization and its impact on computer cost /performance.

**Books Recommended:**

1. Computer system Architecture – M. M. Mano
2. Digital electronics – B. Ram.
3. Digital logic and Computer Design - Morris Mano

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**SEMESTER- I**

**COURSE CODE : - MJ-101P**  
**COURSE TITLE : - Lab Based on Office Tools**  
**CREDIT : - 1**

**Lab of power point as assignment**

1. Open a Blank presentation
2. Save the presentation as firstLab.pptx
3. Add a Title to the first slide: the name of your college
4. Type your first name and last name in the Subtitle section
5. Add a New Slide which has a Title and Content
6. Add a title to the second slide "My college"
7. In the Content section of the second slide, add information about college
8. Right click on the second slide from the left panel, then choose Duplicate Slide
9. Highlight the text in the Content area of the third slide. Under the Home tab, click Convert to SmartArt, then choose Basic Cycle
10. From the left panel, drag the third slide between the first and second slide
11. Change the layout of the third slide, the slide that does not have the Smart Art, to Comparison
12. Leave the title "My college"
13. In the head of the first column, type "my first day in college," then center the heading
14. In the head of the second column, type "my college friends," then center the heading
15. Add at least three points in each section
16. Then add a New Slide
17. Change the layout of the new slide to Blank
18. Insert a Graduation Online Picture from the Office ClipArt—Choose any image of your choice
19. Change the ClipArt size to 3" X 3" and position it in the middle of the slide
20. Apply the Wisp Design Theme
21. Save first Lab.pptx
22. open first Lab.pptx
23. Save the presentation as secondLab.pptx
24. Apply the Ripple Transition to all slides
25. In the second slide, **Demote** all bullets below **Great Presentation**
26. Apply **Grow & Turn** animation to all slides
27. **Reorder** the second slide **Animation**
28. Add **Notes** to the **second** slide entitled "My semester 1 journey"

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29. Add the **Header and Footer**
30. Change the **Design Variants** to **Wisp Light Blue**

## Lab of Ms-word as assignment

*Type the following text in Document.*

### Organizations Structure

Organizations can be regarded as people management systems. They range from simple hierarchies along traditional lines to complex networks dependent on computer systems and telecommunication. Human resource managers can encourage organization to adopt strategies (for their structures) which foster both cost-effectiveness and employee commitment. Organizations structures can be classified into a number of types, including functional, divisional, matrix, federations and networks.

### Functional Structures

Early organizational design divided enterprises into relatively simple parts, splitting them into defined activities such as production, marketing or personal. Functional organizations have the advantage of being simple to understand with clear lines of command, specified tasks and responsibilities. Staff can specialize in a particular business area such as production or marketing and follow well-defined career path. This is equally true of human resource specialists who can develop expertise in specific areas such as employee relations or reward management.

### Perform the Following Operations Based on the Above Passage.

1. 'Save' the file as a 'Document file' in C:\Desktop\yourname. (Create the directories wherever necessary)
2. 'Save' the file as a 'web page' in C:\Director\SalesMgr\AreaMgr2.
3. Change the 'page Layout' to 'Landscape'.
4. Change the Right Margin of the document to 2.0.
5. Change the Left Margin of the document to 1.5.
6. Apply different heading styles to the text 'welcome to MS-Word'.
7. Underline the heading.
8. Align the heading to the 'centre' of the page.
9. Change style "Organization" to "italics" wherever it occurs.
10. 'Justify' the passage.
11. Type your name at the end of the passage and 'Right justify' it.

### Open the Above Created Document and perform the Following Operations.

1. Change the font of the heading to 'Arial'.
2. Insert Date at the top of the document and 'Left justify' it.
3. Change the 'line spacing' to '1.5 lines'.
4. Apply 'Drop Cap' to the passage for the first 3 lines.
5. Change the view to 'Normal Layout', 'Webpage Layout', 'print Layout', 'Reading Layout' And 'outline Layout'.
6. Move the cursor to line number '7'.
7. Hide the 'Ruler' from the document.
8. Insert a new 'Page' after the passage.

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9. Add the definition of organization as a 'Comment' to the word "Organization" appearing in the first line of the passage.
10. 'Preview' the document.
11. Change 'Background' of the document to 'Red' color.

**Lab of Excel as assignment**

1. Open a new 'Worksheet' and save it with file name "**Anjali**".
2. Open 'Worksheet', type **Challenge**, in cell E3.
3. Change the font of the content of cell E3 to Arial and size to 16.
4. Format the content of cells E3 to Bold and Italic.
5. Type some data in cells D5 and C5 and
  - i. Copy contents of cell D5 into cell C1.
  - ii. Cut the contents of cell C5 and paste it in cell F3.
  - iii. Fill the content of cell D5 into next 4 cells using mouse.
6. Using the fill option in the edit menu do the following.
  - i. Fill in a series of numbers from 1 to 20 (row wise & column wise).
  - ii. Fill in a series of dates.
  - iii. Fill in a series of weekdays.
  - iv. Fill in a series of alphanumeric numbers.
  - v. Fill in a series of months.
7. Create and delete a custom fill series of alphabets.
8. Enter a few random numbers and then 'Format' the number with thousand's separator and a decimal of two digits.
9. Enter some data into different cells locked at different places of the worksheet.
10. Insert a 'Header and footer' to a worksheet.
11. Replace the 'Sheet Name' called sheet with the name of your college.
12. View the data in 'page Break' format.
13. Type some text in cell D5 and give a 'Comment'.

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**SEMESTER- II**

**COURSE CODE : - MJ-201T**  
**COURSE TITLE : - PROGRAMMING IN C**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$

*Total =* 60

**Module 1:** Origin and Introduction Programming languages About C, Evolution of C, Structure of a C Program, Compilers & Interpreters Compiling a C Program, A Simple C Program.

**Module 2:** Data Types, Variables and Constants Data Types Variables, Constants Operators, Type Modifiers and Expressions Operators, Type Modifiers Expressions, Introduction to Input/output Console I/O Functions, Unformatted Console I/O Functions.

**Module 3:** Control Constructs Control Statements, Conditional Statements, Loops in C, The break Statement, The Continue Statement.

**Module 4:** Arrays and String Introduction to Arrays, One Dimensional & Two-Dimensional Arrays. Introduction to strings

**Module 5:** Functions Introduction to Functions, Function Declaration and Prototypes, Recursion in Function.

**Module 6:** Pointers Introduction to Pointers, Pointer Notation. Pointer Declaration and Initialization, Accessing Variable through Pointer, Pointer Expressions, Pointers and One-Dimensional Arrays.

**Module 7:** Structures Structure Definition, Structure Initialization, Arrays of Structures, Arrays within Structures. Structures within Structures, Passing Structures to Functions

**Module 8:** File Handling in C What is a File, Defining and Opening a File, Functions for Random Access to Files.

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**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. The course is designed to provide complete knowledge of C language.
2. Students will be able to develop logics which will help them to create programs, applications in C.
3. Learning the basic programming constructs they can easily switch over to any other language in future.

**Reference Books:**

1. Programming in C By Stephen G. Kochan
2. Programming in C By E balagurusamy

**Reference Books:**

1. Programming in C By Stephen G. Kochan
2. Programming in C By M.T. Somashekara

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**SEMESTER- II**

**COURSE CODE :- MJ-201P**  
**COURSE TITLE :- PROGRAMMING IN C**  
**CREDIT :- 1**

**List of Programs as Assignments:**

1. Write a Hello World Program in C.
2. Write a C program to check whether the given number is positive or negative.
3. Write a C Program to find greatest of three numbers.
4. Write a C Program to print Fibonacci series in a given range.
5. Write a C Program to find factorial of a given number.
6. Write a C program to find Prime numbers in a given range.
7. Write a C Program to check if given number is Armstrong or not.
8. Write a C Program to check if given number is palindrome or not.
9. Write a C program to display palindrome numbers in a given range
10. Write a C Program to check if number is odd or even
11. Write a C Program to find out the ASCII value of a character
12. Write a C Program to find the size of int, float, double and char
13. Write a C Program to check whether an alphabet is vowel or consonant.
14. Write a C Program to check leap year.
15. Write a C Program to find sum of first n natural numbers.
16. Write a Program to convert string from upper case to lower case.
17. Write a Program to convert string from lower case to upper case.
18. Write a C program to Sort a set of strings in ascending alphabetical order.
19. Write a C program Find length of a string without using strlen().
20. Write a C program to String concatenation without using strcat.
21. Write a Program to sort array in ascending order.
22. Write a C program to find largest element of given array.
23. Write a C program to find sum of array elements.
24. Write a C Program to find number of elements in an array.
25. Find the value of  $nPr$  for given value of n & r.
26. C Program to multiply two floating numbers.
27. C Program to find out Quotient and Remainder.
28. C Program to find average of two numbers
29. Binary to decimal conversion
30. C Program to convert Decimal to Binary

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31. Write a c program to find multiplication of two matrices.
32. Write a c program to add two matrices.
33. Write a program in C to find the sum of the series  $1!/1+2!/2+3!/3+4!/4+5!/5$

**FUNCTION**

Write the following programs using function:

1. Write a C program to Reverse an input number using recursion.
2. Write a C program to Reverse a String using recursion.
3. Write a C programming to find out maximum and minimum of some values using function which will return an array.
4. Write a C Program to find greatest of three numbers.
5. Write a C Program to print Fibonacci series in a given range.
6. Write a C Program to find factorial of a given number.
7. Write a C program to find Prime numbers in a given range.
8. Write a C Program to check if given number is Armstrong or not.
9. Write a C Program to check if given number is palindrome or not.
10. Write a C program to display palindrome numbers in a given range

**Pointer**

1. Write a Program to sort array in ascending order.
2. Write a C program to find largest element of given array.
3. Write a C program to find sum of array elements.
4. Write a C Program to find number of elements in an array.
5. Write a C program of Binary to decimal conversion
6. Write a C Program to convert Decimal to Binary
7. Write a c program to find multiplication of two matrices.
8. Write a c program to add two matrices.
9. Write a program in C to find the sum of the series  $1!/1+2!/2+3!/3+4!/4+5!/5$

**Structure**

1. Write a program to Store information of a student using structure
2. Write a program to Add two complex numbers by passing structures to a function
3. Write a program to Store information of n students using structures

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**SEMESTER- II**

**COURSE CODE :- MJ-202T**  
**COURSE TITLE :- OPERATING SYSTEM**  
**CREDIT :- 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$

*Total =* 60

**Module 1:** Concept of Operating System: Simple batch systems, multiprogrammed batch systems, time-sharing systems, parallel systems, distributed systems, real-time systems.

**Module 2:** Computer System structure: Computer System Operation, I/O structures storage structure, storage hierarchy and hardware protection.

**Module 3:** Operating System structure: System components, system services, system calls, system programs, and system structure- simple structure. Process concept: process state, process control blocks, process scheduling and schedulers

**Module 4:** CPU scheduling: CPU-I/O burst cycle, scheduling criteria, scheduling algorithms (Non pre-emptive-FCFS, SJFS, Pre-emptive-SJFS, and RR).

**Module 5:** Memory management: contiguous allocation, Paging, Swapping, And Segmentation. Virtual memory- Demand paging, page replacement, page replacement algorithms (FIFO, LRU).

**Module 6:** File system structures- file allocation (contiguous, linked, and indexed

**Module 7:** Disk structure- Disk scheduling (FCFS, SSTF, SCAN)

**Module 8:** Security- The problem, authentication, and program- threats, encryption.

**course Outcomes: -**

**After the completion of this course, students will be to:**

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# DEPARTMENT OF INFORMATION TECHNOLOGY

Dr. Shyama Prasad Mukherjee University



[www.dspmuranchi.ac.in](http://www.dspmuranchi.ac.in)

1. Describe the main components of OS and their working .
2. Explain the concepts of process and thread and their scheduling policies
3. Solve synchronization and deadlock issues
4. Compare the different techniques for managing memory.
5. I/O, disk and files .
6. Design components of operating system

## Books Recommended:

1. Operating System: Peter Gelvin
2. Operating System: God bole Dhamdhare

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**SEMESTER- II**

**COURSE CODE :- MJ-202P**  
**COURSE TITLE :- Lab Based on MS DOS**  
**CREDIT :- 1**

LAB: MS.DOS/LINUX

Basic of DOS commands-

1. DATE
2. TIME
3. VER
4. VOL
5. CLS
6. COPY CON
7. TYPE CON
8. COPY
9. REN
10. MD
11. CD
12. RD
13. TREE,
14. External Commands-
15. XCOPY
16. DEL
17. DELTREE
18. CHDSK and
- 19 Batch Creation
20. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
21. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.
22. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
23. Write a shell script to check if the number entered at the command line is prime or not.
24. Write a shell script to modify "cal" command to display calendars of the specified months.
25. Write a shell script to modify "cal" command to display calendars of the specified range of months.

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**SEMESTER- III**

**COURSE CODE :- MJ-301T**  
**COURSE TITLE :- DATA STRUCTURE WITH C**  
**CREDIT :- 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

Group-A: Objective questions (Compulsory)	:	2 X 10 = 20
Group-B: short type questions (3 out of 5 questions)	:	3 X 5 = 15
Group-C: Descriptive Type Questions (2 out of 4 questions)	:	12.5X2 = 25
		-----
Total =		60

**Module1:** Introduction to Data Structure Basic Concepts, Algorithms, Notations, Data Structure operations. Implementations of Data Structures, Mathematical Notations, Functions.

**Module2:** ARRAYS Insertion and deletion of element from an Array, Static Memory Allocation, searching

**Module 3:** STACK And Queue Implementation of Stack, Array-based Implementation. Applications of Stack. Evaluating Postfix Expression, Simulating Recursive Function using Stack.

**Module 4:**QUEUE Queue Implementation, Array-based Implementation.

**Module 5:** LINKED LISTS Dynamic Allocation of Memory, Representation of Linked List. Implementation of Single Linked List, Insertion, deletion and traversing through single linked list. Implementation of Doubly Linked Lists, Insertion,deletion and traversing through Double linked list

**Module 6:** TREES Introduction to Trees, Binary Tree, Implementation of Binary tree, Binary Tree Traversal. Searching a Binary Tree,

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**Module 7:** Binary search tree, Insertion, deletion and traversing through BST, Introduction to Threaded Binary Trees, AVL Tree.

**Module 8:** Searching and Sorting Linear or Sequential Search, Binary Search. Bubble sort, Selection sort, Insertion sort, Quick sort, Simple Merge sort, heap sort.

## Course Outcomes: -

**After the completion of this course, students will be to:**

1. Define various linear and non-linear data structures like stack, queue, linked list, tree and graph.
2. Explain operations like insertion, deletion, traversal, searching, sorting etc. on various data structures ,
3. Design various data structures and their operations.
4. Analyze the performance of data structure based operations including searching and sorting.

## Books Recommended:

1. Data Structures – Lipschitz.
2. Data Structures through C-Y.P. Kanetkar.
3. Data Structure – Samanta

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**SEMESTER- III**

**COURSE CODE : - MJ-301P**  
**COURSE TITLE : - DATA STRUCTURE WITH C**  
**CREDIT : - 1**

**Lab of Data Structure with C as assignment**

1. Program to Find the Number of Elements in an Array
2. Develop and implement a menu driven program in C for the following Array operations
  - a. Creating Array of N Integer elements.
  - b. Display of Array elements with suitable headings.
  - c. Inserting an element (ELEM) at a given valid position (POS).
  - d. Deleting an element at a given valid position (POS).
  - e. Exit
3. Programs for Stack, Queues using Arrays
4. Program to convert an Infix Expression into Postfix and Postfix Evaluation
5. Program to implement stack using arrays
6. Program to implement queue using arrays
7. Program to reverse elements in a queue
8. Program to create add remove & display element from single linked list
9. Program to create add remove & display element from double linked list
10. Program to count number of nodes in linear linked list
11. Program to concatenate two linear linked lists
12. Program to accept a singly linked list of integers & sort the list in ascending order.
13. Program to reverse linked list
14. Program for the creation of binary tree in c
15. Program for pre-order, post-order & in-order traversals of a binary tree using non recursive.
16. Program to count no, of leaves of binary tree
17. Program for implementation of Binary Search -tree (insertion & deletion)
18. Program to implement bubble sort program using arrays
19. Program to implement merge sort using arrays
20. Program to implement selection sort program using arrays
21. Program to implement insertion sort program using arrays
22. Program to implement bubble sort program using pointers
23. Program to implement linear search using arrays
24. Program to implement Tower of Hanoi problem.
25. Program to implement binary search using arrays

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**SEMESTER- III**

**COURSE CODE** : - MJ-302T  
**COURSE TITLE** : - GRAPH THEORY  
**CREDIT** : - 3

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

Group-A: Objective questions (Compulsory)	:	2 X 10 = 20
Group-B: short type questions (3 out of 5 questions)	:	3 X 5 = 15
Group-C: Descriptive Type Questions (2 out of 4 questions)	:	12.5X2 = 25
		-----
Total =		60

**Module 1:** Introduction: What are Graph, Application of Graphs, Finite and Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex and Null Graph?

**Module 2:** PATHS AND CIRCUITS: Isomorphism, Sub graphs, Walks, Paths and Circuits, Connected Graphs, Disconnected Graphs and Components,

**Module 3:** Euler Graphs, Operations on Graphs, Hamiltonian Paths and Circuits, The Travelling Salesman Problem.

**Module 4:** TREES AND FUNDAMENTAL CIRCUITS: Trees, Some Properties of Trees, Pendent Vertices in a Tree, Distance and Centers in a Tree, Spanning Trees, Fundamental Circuits, Finding all Spanning Trees of a Graph.

**Module 5:** CUT-SETS AND CUT VERTICES: Cut Sets, Some Properties of a Cut-Set, All Cut Sets in a Graph, Fundamental Circuits and Cut-Sets,

**Module 6:** Connectivity and Separability, Network Flows, I-Isomorphism, 2-Isomorphism. (Statements and applications of Theorems only, no proofs).

**Course Outcomes: -**

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**After the completion of this course, students will be to:**

1. Analyze different types of graphs and their applications in real world.
2. Perceive the role of cut-set, cut-vertex and fundamental circuits in network flows.
3. Create an awareness of planar and dual graph.
4. Explain how to represent graphs in a computer system,

**Books Recommended:**

1. Graph Theory: Nursing Dev

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**SEMESTER- III**

**COURSE CODE : - MJ-302P**  
**COURSE TITLE : - LAB BASED ON GRAPH THEORY**  
**CREDIT : - 1**

**Suggested Practical List**

Using C Programming Language: -

1. Program to find the vertices, even vertices, odd vertices and number of edges in the graph.
2. Program to find the union, intersection and ring sum of two graphs
3. Program to find shortest path between 2 vertices in a graph
4. Program to find path between two vertices using Hamilton path.
5. Program to find shortest path between every pair of vertices in a graph.
6. Program for finding maximum matching for general path

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**SEMESTER- IV**

**COURSE CODE** : - **MJ-401T**  
**COURSE TITLE** : - **PROGRAMMING IN C++**  
**CREDIT** : - **3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$
		-----
<i>Total =</i>		<b>60</b>

**Module 1: OOPS:** Concepts of OOPS and differences with procedural languages, characteristics of OOPS (Idea of objects, class, data abstraction & encapsulation, inheritance, polymorphism, dynamic binding, I/O stream, Cin, Cout, I/O manipulation).

**Module2:** Data Types, operators, Control structure & looping statements, Functions and arrays.

**Module 3:** Objects & classes: classes and objects, constructor, destructor

**Module 4:** Operators overloading: binary operators using member function and friend function

**Module 5:** Inheritance: Derived class and base class, protected access specifier, derived class constructors, class hierarchies, abstract base class, public and private inheritance, Multiple inheritance, containership (classes within classes).

**Module 6:** Pointers: Address and pointers, pointers and arrays, memory management. "New" & "delete" pointer to objects, pointer to pointer and "this" pointer

**Module 7:** Functions: Virtual functions, Friend functions, static functions.

**Module 8:** Files and streams: String, string I/O, object I/O, I/O with multiple objects file pointer

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**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Understand the difference between the top-down and bottom-up approach
2. Describe the object-oriented programming approach in connection with C++
3. Apply the concepts of object-oriented programming
4. Illustrate the process of data file manipulations using C++

**Books Recommended:**

1. C++ -Lafore
2. C++ -Balaguruswamy
3. C++ -Kanetkar

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**SEMESTER- IV**

**COURSE CODE : - MJ-401P**  
**COURSE TITLE : - Lab Based on C++**  
**CREDIT : - 1**

List of C++ program as assignment

1. Write a C++ program to find the sum for the given variables using function with default arguments.
2. Write a C++ program to swap the values of two variables and demonstrates a function using call by value.
3. Write a C++ program to swap the values of two variables and demonstrates a function using Call by reference using reference type (&).
4. Write a C++ program to swap the values of two variables and demonstrates a function using Call by reference using pointer (\*).
5. Write a C++ program to swap the values of two dynamically allocated variables and release the memory after swapping. (use new & delete operators)
6. Write a program to find the largest, smallest & second largest of three numbers. (use inline function MAX and MIN to find largest & smallest of 2 numbers)
7. Write a program to calculate the volume of different geometric shapes like cube, cylinder and sphere and hence implement the concept of Function Overloading.
8. Write a C++ program to create a template function for Bubble Sort and demonstrate sorting of integers and doubles.
9. Define a STUDENT class with USN, Name, and Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name and the average marks of all the students.
10. Write a C++ program to create a class called COMPLEX and implement the following overloading functions ADD that return a complex number:  
(i) ADD (a, s2) – where 'a' is an integer (real part) and s2 is a complex number  
(ii) ADD (s1, s2) – where s1 and s2 are complex numbers.
11. Friend functions and friend classes:  
a) Write a program to define class name HUSBAND and WIFE that holds the income respectively. Calculate and display the total income of a family using Friend function.  
b) Write a program to accept the student detail such as name and 3 different marks by get\_data() method and display the name and average of marks using display() method. Define a friend class for calculating the average of marks using the method mark\_avg().
12. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
13. Write a C++ program to declare Struct. Initialize and display contents of member variables.
14. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

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15. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
16. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
17. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
18. Write a C++ program to allocate memory using new operator.
19. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
20. Write a C++ program to create an array of pointers. Invoke functions using array objects.
21. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

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**SEMESTER- IV**

**COURSE CODE :- MJ-402T**  
**COURSE TITLE :- COMPUTER NETWORK**  
**CREDIT :- 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$
		-----
<i>Total =</i>		<b>60</b>

**Module1:** Basic network concepts, advantages and disadvantages of computer networks, types of networks-LAN, WAN, MAN LAN Technology: LAN architecture, Bus/Tree LAN, Ring & Star LANs Network topologies, Hardware requirement of a network, Network operating system.

**Module 2:** A communication model, three-layer approach to protocols, brief introduction to TCP/IP and OSI (brief function to different layers),

**Module 3:** Data Transmission: concept and terminology, analog and digital data transmission. Transmission impairments, Guided transmission media. digital data digital signal, digital data analog signal, analog data digital signal and analog data analog signal

**Module 4:** Data link control: flow control, error detection Error control, High level data control (HDLC).

**Module 5:** Circuit switching: switched network, circuit switching networks, switching concepts, Packet Switching: packet switching principals, congestion and control

**Module 6:** Ethernet: -Standard Ethernet and Fast Ethernet, CSMA/CD, CSMA/CA, Token ring

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**Module 7:** Network Security: Requirements, conventional encryption, public key encryption & digital signature. (No numerical related questions are to be asked)

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Identify the elements of a communication network.
2. Illustrate different data communications and networking standards.
3. Design and implement a simple LAN and a WAN that meet a specific set of criteria.
4. Identify the new trends and technologies, their potential applications.
5. Examine the social impact of the networking technology particularly on issues related to security and privacy.

**Books Recommended:**

1. Data Communication and Networking: Tannenbaum
2. Data Communication and Networking: W. Stalling
3. Data Communication and Networking: Frozen

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**SEMESTER- IV**

**COURSE CODE :- MJ-402P**  
**COURSE TITLE :- Lab Based on Computer Configuration**  
**CREDIT :- 1**

Installation of operating system, introduction of hardware.

**List of Assignment for Computer Network**

1. Windows as operating system, history, versions.
2. PC hardware
3. Application installation, configuration and maintenance
5. Server services and Client services
6. Difference between Windows/windows7 and windows server 2003/2008

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**SEMESTER- IV**

**COURSE CODE :- MJ-403T**  
**COURSE TITLE :- DATA BASE MANAGEMENT SYSTEM**  
**CREDIT :- 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

Group-A: Objective questions (Compulsory)	:	2 X 10 = 20
Group-B: short type questions (3 out of 5 questions)	:	3 X 5 = 15
Group-C: Descriptive Type Questions (2 out of 4 questions)	:	12.5X2 = 25
		-----
Total =		60

**Module1:** Introduction to DBMS- Purpose, difference with respect to conventional file processing system, data abstraction, data independence, data models (object-based, record based, physical data models), database administrator, overall system structure.

**Module 2:** Entity- Relationship model- Relationship sets, Mapping, keys and entity sets. Entity Relationship diagram, specialization, generalization and aggregation.

**Module 3:** Relational algebra- Project, select, Cartesian product, joins, union, intersection.

**Module 4:** Normalization-Functional dependency, 1NF, 2NF, 3NF, BCNF, & 4NF.

**Module 5:** Transaction- concepts, transaction state, concurrent executions, serializability, conflict serializability, view serializability.

**Module 6:** Concurrency control- locks, granting of locks, timestamp-based protocols, deadlock prevention, detection & recovery

**Module 7:** Security- Authorization.

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**Module 8:** Oracle: - Oracle functions, SQL, simple queries, nested sub-queries, self-join, equijoin, non-equijoin, PL/SQL programming (Writing small blocks for data Manipulation).

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Analyze data organization requirements and their inter relationships.
2. Illustrate the features of data models and their application for storing data.
3. Design queries to maintain and retrieve useful information from the databases created.
4. Analyze the physical database design with respect to their expected performance using normalization and query processing.
5. Examine the best practices according to concepts of indexing,
6. transaction control and concurrency maintenance

**Books Recommended:**

1. DBMS -Korth
2. DBMS -C.J. Date
3. Oracle –Byross

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**SEMESTER- IV**

**COURSE CODE : - MJ-403P**  
**COURSE TITLE : - LAB BASED ON DBMS**  
**CREDIT : - 1**

Write the following queries:

1. List all information about all department from emp table.
2. List all employee names along with their salaries from emp table.
3. List department names and locations from the dept table.
4. List the employees belonging to the department 20.
5. List the name and salary of the employees whose salary is more than 1000.
6. List the names of the clerks working in the department 20.
7. List the names of analysts and salesmen.
7. List the details of the employees who have joined before the end of September 81.
8. List the names of employees who are not managers.
9. List the names of employees whose employee number are 7369, 7521, 7839, 7934, 7788.
10. List the employee details not belonging to the department 10, 30, and 40.
11. List the employee name and salary, whose salary is between 1000 and 2000.
12. List the employees who are eligible for commission.
13. List the details of employees, whose salary is greater than 2000 and commission is NULL.
14. List the employees whose names start with an "S" (not"s").
15. List the name, salary and PF amount of all the employees(PF is calculated as 10% of salary).
16. List the empno, ename, sal in ascending order of salary.
17. List the employee name, salary, job and Department no descending order of Department No and salary.
18. List the employee details in ascending order of salary.
19. List the employee details in descending order of salary
20. Find the minimum salary of all employees.
21. Find the maximum, minimum, and average salaries of all employees.
22. List the maximum and minimum salary of each job type.
23. Find how many managers are in each dept.
24. Find the average salary and average total remuneration each job type.Remembers sales man earn commission.
25. Find out the difference between highest and lowest salary.

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26. Find all department s which have more than three employees.
27. Check whether all employee nos are unique. ( No Duplicate)
28. List lowest paid employee working for each Manager.  
Exclude any groups where the minimum salary is less than 1000. Sort the output by salary.

**SEMESTER- V**

**COURSE CODE** : - **MJ-501T**  
**COURSE TITLE** : - **PROGRAMMING IN JAVA**  
**CREDIT** : - **3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	<i>2 X 10 = 20</i>
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	<i>3 X 5 = 15</i>
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	<i>12.5X2 = 25</i>
		-----
<i>Total =</i>		<i>60</i>

**Module 1:** Introduction to Java: History of Java, features of Java, types of Java programs.

JDK Tools: Javac compiler, Java interpreter, applet viewer, Java tools, Javap disassemble, Javadoc Tool, JavahTool, Java keywords,

**Module 2:** Data types in Java, Variable naming conventions, Initializing variables, literals, operators, type conversion, construct, looping construct, Arrays and vectors.

**Module 3:** Classes and objects: Declaring classes, creating objects, declaring objects, declaring methods, passing arguments to methods,

**Module 4:** Constructors, access specifiers (public, private, protected, Default), modifiers, the Method Overloading, Method Overriding, Garbage collection (Introduction).

**Module 5:** Inheritance: Introduction to Inheritance, Types of Inheritance Abstract class and Interface

**Module 6:** Introduction to threads: Threads, Single threaded and multithreaded applications, life cycle of a Thread, the current thread, the thread class, Problems in multithreading.

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**Module 7: Packages:** Java packages, using a package, the Lang packages, the package, the creating a package.

**Module 8: Applets & Applications:** Applet class, Applet & HTML, Life cycle of an Applet, Graphic class (Introduction), passing parameters to Applets, Creating an application

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Use the knowledge of object oriented programming through Java
2. Identify the difference between procedural and OO programming.
3. Successfully use the JDK of various versions for programming ,
4. Apply latest know-how related to the new developments in the field of Java
5. Construct programs using various OOP principles ,
6. Design UI using JAVA GUI components.
7. Operate on files and strings in real life scenarios. Analyze thread performance and inter thread communication issues

**Books Recommended:**

1. Java- Complete Reference
2. Mastering Java

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## SEMESTER- V

**COURSE CODE : - MJ-501P**  
**COURSE TITLE : - LAB BASED ON JAVA**  
**CREDIT : - 1**

List of java program as assignment

1. WAJP to show the characteristic of a number. {E.g. 24 it has two coefficients 2 in tens position and 4 in units position. It is composed of 2 and 3. It is a positive number. Also show whether it is odd or even.
2. WAJP to take input through command line argument and do the following:
  - a) Check whether the number is prime.
  - b) Generate the reverse a number.
3. Write a menu driven program using switch in Java to perform following:
  - a) For input of 1, check whether the number is prime
  - b) For input of 3, find the factors of the number
  - c) For input of 5, check the number is odd or even.
4. Write a program in Java to generate hexadecimal equivalent of a number without using array.
5. WAJP to take two number inputs through command line argument and do the following:
  - a) Check whether two numbers are prime to each other or not.
  - b) Find LCM of two numbers.
6. WAJP to create a class and exhibit the role of static functions (other than main) by declaring, defining and calling them.
7. WAJP to compute and display the count of occurrence of 4 in a number. E.g. 4564 will compute 2.
8. WAJP to sort a list of numbers in ascending order.
9. Write a program in Java to take input of two 3×3 matrices through command line argument and then:
  - a) Add them up and display the result
  - b) Subtract them and display the result
  - c) Multiply them and display product
10. WAJP to count the number of words, characters in a sentence.

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11. Write a program in Java to take input of a sentence through command line argument and then count the number of words and vowels.
12. WAJP to handle the Exception using try and multiple catch block; the exceptions that you will handle are, number format error, array bound error and divide by zero.
13. WAJP to create a class called Room with two data member length and width and then implement constructor overloading in it.
14. WAJP to create a class called Fraction with data member numerator and denominator; take input (through command line argument) of two fractions and then add, subtract, multiply and divide, finally display the result in reduced term.
15. Write a program in Java to create a class for Employee having 2 data member code and name. Then create 3 classes Officer, Admi Staff and MStaff. The Officer class has data members designation and pay-scale; the Admi Staff has data members grade and pay-band; the MStaff has data member department and two sub-classes Regular and Casual. The Regular staff has data members level and consolidated-pay and Casual has data member daily-wage. Take all inputs through constructors and write appropriate methods for displaying one data for each type of class.
16. WAJP to design a class called Account using the inheritance and static that show all function of bank (withdrawal, deposit) and generate account number dynamically.
17. Write a program in Java to explain the role of the following:
  - a) Non-parameterized constructor
  - b) Parameterized constructor
  - c) Copy constructor
16. WAJP to design an application Password.java that produces and prints a random password depending upon name of an individual. If the input is Abdul Kalam, then the password would be 33421LAM. Note: take the first name A=1, B=2, D=4, U=21 where  $2+1=3$ , and L=12, where  $1+2=3$ ; so the number comes to be 12433, so u can find out.
17. WAJP to take a string count all vowels and then delete the same from the string.
18. Write a Patient class which inherits from the Person class. Patient can again be of two types, indoor and outdoor. The Patient class requires the following:
  - a) a variable to store the patient ID for the patient
  - b) a variable to store the department of hospital
  - c) a variable to store the ward of hospital
  - d) a variable to store the patient 's date of joining the hospital
  - e) a variable to store the patient 's address
  - f) a variable to store the medical fees that the patient pays
  - g) constructor methods, which initialize the variables
  - h) a method to calculate the medical fees (for both indoor and outdoor patient)

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19. Write a class called **Shape** which contains a user-defined interface for **Computation**, which contains methods for calculation of area, perimeter and volume. Write four classes for **circle**, **rectangle**, **sphere** and **rectangular parallelepiped**, and all these classes inherit from Shape. Now take input for the following:  
radius of circle and compute its area and perimeter Length and breadth of rectangle and compute its area and perimeter Length, breadth and height for **rectangular parallelepiped** and compute its area and volume  
Radius of sphere and compute its area and volume

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**SEMESTER- V**

**COURSE CODE : - MJ-502T**  
**COURSE TITLE : - OBJECT ORIENTED MODELING AND DESIGN**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$
		-----
<i>Total =</i>		<b>60</b>

**Module 1: Introduction:** What Is Object-Oriented? What Is Object Oriented Development? Object Oriented Theme.

**Module 2: Modeling as a Design Technique:** Modeling, Abstraction, The three models.

**Module 3: Class Modeling:** Object and class concepts, link and association concepts, Generalization and inheritance, a sample class model. **Advanced class Modeling:** Aggregation, abstract classes, multiple inheritances, metadata, and constraints.

**Module 4: State Modeling:** Events, states, state diagrams. **Advanced states Modeling:** Nested state diagrams, nested states, concurrency, a sample state model.

**Module 5: Interaction Modeling:** Use case models, sequence models, activity models, Data Flow Diagrams

**Module 6: Process Overview:** Development states, Development life cycle.

**Module 7: System Design:** Overview of system design, breaking a system into subsystems, indentify concurrency, allocation of subsystems, management of data storage, handling global resources, choosing a software control strategy, handling boundary conditions, setting trade-off priorities, common

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Architectural styles, architecture of the ATM system.

**Module 8: Programming style:** Object-Oriented Style, Reusability, Extensibility, Robustness, Programming – in-the-Large.

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Explain the features of database management systems and Relational database
2. Design the ER-models to represent simple database application scenarios.
3. Applying UML, it collects the requirements and prepare their scenarios and design.
4. Understand the functional dependencies and design of the database.

**Book Recommended**

1. Michael R Blaha and James R Rumbaugh– Object Oriented Modeling and Design, PHI, New Delhi, 2003

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**SEMESTER- V**

**COURSE CODE** : - **MJ-502P**  
**COURSE TITLE** : - **Lab Based on Object Oriented with UML**  
**CREDIT** : - **1**

1. Draw a **Class diagram** for Library Management System.
2. Draw a **Class diagram** for College Management System.
3. Draw a **Use Case diagram** for Online Banking System.
4. Draw a **Use Case diagram** for Bank ATM System.
5. Draw a **State diagram** for Telephone line System.
6. Draw a **Data flow diagram** for hotel management system.
7. Draw a **Data flow diagram** for railway management system.
8. Draw an **Activity diagram** for student management system.
9. Draw an **Activity Diagram** for stock trade processing system.
10. Draw a **Sequence diagram** for online stock broker.

- Create the Initial Class Diagram
- Create Subsequent Class Diagrams
- Saving Edited Diagrams and Reflecting those Changes in the Code
- Editing Code and Reflecting those Changes in the Diagram
- Adding Existing Classes or Interfaces to a Diagram
- Adding New Classes or Interfaces to a Diagram
- Adding Inheritance Relationships Between Classes and/or Interfaces
- Adding Association Relationships Between Classes
- Adding Fields to Classes
- Adding Methods to Classes and Interfaces

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**SEMESTER- V**

**COURSE CODE : - MJ-503T**  
**COURSE TITLE : - WEB TECHNOLOGY**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	<i>2 X 10 = 20</i>
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	<i>3 X 5 = 15</i>
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	<i>12.5X2 = 25</i>
		-----
<i>Total =</i>		<i>60</i>

**Module 1:** History of the Internet and World Wide Web, Search Engines, News-group, E-mail and its Protocols, Web Portal, Browsers and their versions, Its functions, URLs, web sites

**Module 2:** Static Web Development: HTML - Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and Sound, lists types of lists, tables, frames and Developing Forms

**Module 3:** DHTML: Introduction to DHTML, JavaScript &DHTML, Document Object Model, DHTML Events, Dynamically change style to HTML Documents.

**Module 4:** Cascading Style Sheet: Types of Style Sheets – Internal, inline and External style sheets, creating styles, link tag.

**Module 5** Introduction to Java Script: Data Types, Control Statements, operators, Functions, Objects in Java Script, Handling Events.

**Module 6** Server-Side-Scripting -Server-side -scripting and Client-side-scripting, Differences between ASP and ASP.NET. ASP.NET Web Forms: The code behind Web Form-Separations of content, Web Form Page-Stages in Web Form Processing.

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**Module 7:** Introduction to ADO.NET: Comparison between ADO & ADO.NET—The difference between Connection Model & Disconnected Model – difference between the Dataset and Record Set-

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Describe the components of the Internet and Web technology,
2. Explain the basics of Internet technology, such as http and the World Wide Web,
3. HTML, and JavaScripts; Create WWW pages to serve as front-end to client/server,
4. Internet applications
5. Analyzing and designing Internet applications and testing and documenting the solutions developed

**Books Recommended:**

1. HTML DHTML Java Script VB Script – Ivan Bayross

Black Book: Holzner

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**SEMESTER- V**

**COURSE CODE : - MJ-503P**  
**COURSE TITLE : - LAB BASED ON WEB TECHNOLOGY**  
**CREDIT : - 1**

Q.1 Create an HTML document with the following formatting options:

- I. Bold
- II. Italics
- III. Underline
- IV. Headings (Using H1 to H6 heading styles)
- V. Font (Type, Size and Color)
- VI. Background (Colored background/Image in background)
- VII. Paragraph
- VIII. Line Break
- IX. Horizontal Rule
- X. Pre tag

Q.2 Create an HTML document which consists of:

- I. Ordered List
- II. Unordered List
- III. Nested List
- IV. Image

Q.3 Create an HTML document which implements Internal linking as well as External linking. Q.4 Create a table using HTML which consists of columns for Roll No., Student's name and grade.

Q.4. Create a form using HTML which has the following types of controls: I. Text Box II. Option/radio buttons III. Check boxes IV. Reset and Submit buttons

5. Design a web page with Imagemaps.
6. Design a web page demonstrating different semantics
7. Design a web page with different tables. Design a webpages using table so that the content appears well placed.
8. Design a web page with a form that uses all types of controls.
9. Design a web page embedding with multimedia features.
10. Using JavaScript design, a web page that prints factorial/Fibonacci series/any given series.
11. Design a form and validate all the controls placed on the form using Java Script.
12. Write a JavaScript program to display all the prime numbers between 1 and 100.
13. Write a JavaScript program to accept a number from the user and display the sum of its digits.
14. Write a HTML code that displays various formatting tags.
15. Write a HTML code to create ordered list.
16. Write a HTML code to create unordered list.

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17. Write a HTML code to create table having 5 rows and 5 columns.
18. Write a HTML code to create admission form.
19. Write a HTML code to create a frame.
20. Write a HTML code to create image map.
21. Write a HTML code to create hyperlink b/w multiple pages.
22. Write a DHTML code to create cascading style sheet.
23. WRITE A PROGRAM in JavaScript to show a number is big or not.
24. WRITE A PROGRAM in JavaScript to implement for loop.
25. WRITE A PROGRAM in JavaScript to show the usage of if statement.
26. WRITE A PROGRAM in JavaScript to show the usage of if-else statement.
27. WRITE A PROGRAM in JavaScript to show function with an arguments.
28. WRITE A PROGRAM in JavaScript to show number is even or odd.
29. WRITE A PROGRAM in JavaScript to show number is prime or not.

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**SEMESTER- V**

**COURSE CODE : - INT-501P**  
**COURSE TITLE : - INTERNSHIP**  
**CREDIT : - 4**

Students are advised to pursue the Internship Course in the following period:

- I. Break between II & III Semester of one paper containing 4 Credits (Compulsory for all students) or
- II. Break between IV & V Semester of one paper containing 4 Credits (Compulsory for all students) or
- III. During V Semester of one paper containing 4 Credits (Compulsory for all students).

**SEE: ANNEXURE-NEP 2020**

**INTERNSHIP GUIDELINES**

**Internship:** A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

The main reason students need to do internship is so they are well prepared for a graduate job in their chosen field. It is a chance for you to put what you have learned at university to work in the kind of real-life situations you will come up against when you start your career. internship gives you great experience during your degree including:

- First-hand experience working as a professional Developer.
- Apply your technical knowledge to a real-life situation.
- Work with other professionals related to your industry.
- Experience what it's like to work in a professional organisation.
- Increase your technical, interpersonal and communication skills.

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- Observe interactions of engineers with other professional groups.
- Witness the functioning and organisation of business and companies

Student have to do 60 hours industrial Training from two different IT organizations. Student has to produce daily report. In this daily report, Attendee sheet, Work culture and working hour list day by day, must be listed.

## Academic Credits for training shall be based on following:

A Power Point presentation (based on the report) for duration of 10 minutes should be make. This will be presented in front of examiners. Marks will be awarded on this presentation and documents submitted.

## Course Outcomes: -

After the completion of this course, students will be to:

- I. The main Objective, students need to do internship is so they are well prepared for a graduate job in their chosen field.
- II. It is a chance to put what have learned at university to work in the kind of real-life situations it will come up against when it start their career.

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**SEMESTER- VI**

**COURSE CODE : - MJ-601T**  
**COURSE TITLE : - SOFTWARE ENGINEERING**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	<i>2 X 10 = 20</i>
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	<i>3 X 5 = 15</i>
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	<i>12.5X2 = 25</i>
		-----
<i>Total =</i>		<i>60</i>

**Module 1:** Software : Characteristics, Components and Applications, Software process, Software Engineering – A layered Technology, The software process, Software Process models, Linear Sequential Model, Prototyping Model, RAD Model and Evolutionary Software Models.

**Module 2:** Software Process & Project Metrics: Metrics in Project & Process Domains, Software Measurement and Metrics for Software Quality,

**Module 3:** Project Planning Objectives: Software Scope, resources, Software Project Estimation, Decomposition Techniques, Empirical estimation Models, Make-Buy decision.

**Module 4:** Risk Management: Software risks, Risk Identification, Projection, Defining Task set for software Project, selecting software engineering tasks, scheduling and project plan,

**Module 5:** Software Quality Assurance. Software reviews, Formal approach to SQA Software Reliability, The SQA plan.

**Module 6:** Conventional Methods for Software Engg : System Engg. Product Engg., Modeling the System, Architecture, System specifications

**Module 7:** Analysis Concepts & Principles, Software prototyping, Specifications, Analysis Modeling, Design Concepts, Principles & Methods, Design for real-time system, Software Testing Methods

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**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Explain the software engineering principles and techniques
2. Apply Software Project Management Practices,
3. Apply the knowledge gained for their project work as well as to develop software following software engineering standards .
4. Develop self-reliance, technical expertise, and leadership.

**Books Recommended:**

1. Roger S. Pressman – Software Engineering – A Practitioner's Approach – McGraw Hill.
2. Richard Fairley – Software Engineering Concepts, TATA McGraw Hill

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**SEMESTER- VI**

**COURSE CODE : - MJ-601P**  
**COURSE TITLE : - LAB BASED ON SOFTWARE ENGINEERING**  
**CREDIT : - 1**

Lab based on Software Engineering

**1. Practical Title**

- Problem Statement,
- Process Model

**2. Requirement Analysis**

- Creating a Data Flow
- Data Dictionary,
- Use Cases

**3. Project Management**

- Computing FP
- Effort
- Schedule, Risk Table, Timeline chart

**4. Design Engineering**

- Architectural Design
- Data Design, Component Level Design

**5. Testing**

- Basis Path Testing

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**SEMESTER- VI**

**COURSE CODE : - MJ-602T**  
**COURSE TITLE : - DATA MINING AND WAREHOUSING**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$
		-----
<i>Total =</i>		<b>60</b>

**Module 1:** Overview and Concepts of Data Warehousing. Overview of Data warehousing Strategic information and the need for Data warehousing, Evolution of Data warehousing, Data warehousing and Business Intelligence the Building Blocks of Data warehouse.

**Module 2:** Defining features - Subject-oriented data, Integrated data, Time-variant data, Nonvolatile data, Data granularity Data warehouses and Data marts Architectural Types - Centralized, Independent data marts, Hub-and-Spoke.

**Module 3:** Data Staging, Data Storage, Information Delivery, Metadata, and Management and Control components Business Requirements and Data warehouse Requirement Gathering methods and Requirements Definition Document (contents) Business Requirements and Data Design - Structure for Business Dimensions and Key Measurements.

**Module 4:** Implementation And Maintenance: Physical design process, Aggregates and Indexing. Data Warehouse Deployment.

**Module 5:** Data Mining Overview of Data mining - Definition, Knowledge Discovery Process (Relationships, Patterns, Phases of the process), OLAP versus Data mining Some aspects of Data mining - Association rules, Outlier analysis, Predictive analytics etc. Concepts of Data mining in a Data warehouse environment.

**Module 6:** Data Mining Classifiers Classification Algorithms: What is Classification? Classifier Accuracy, Decision Tree and Naïve Bayes Classifier (In brief introduction)

**Course Outcomes: -**

**After the completion of this course, students will be to:**

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1. Illustrate the fundamentals of data mining systems as well as issues related to access and retrieval of data at scale.
2. Explain the various data mining functionalities and data warehousing techniques.
3. Apply the various data mining techniques to solve classification,
4. Clustering and association rule mining problems
5. Design and evaluate data mining models to be used in solving real life problems,
6. keeping in view social impacts of data mining.

**Books Recommended:**

1. Data Warehousing Fundamentals for IT Professionals, Second Edition by Paulraj Ponniah, Wiley
2. Data Warehousing, Data Mining, & OLAP - Second Edition by Alex Berson and Stephen J. Smith, Tata McGraw Hill Education

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**SEMESTER- VI**

**COURSE CODE : - MJ-602P**  
**COURSE TITLE : - DATA MINING AND WAREHOUSING**  
**CREDIT : - 1**

1. Orange Data Mining
2. Orange Widgets
3. Loading your Data
4. Exporting Models
5. Exporting Visualizations
6. Learners as Scorers
7. Report
8. CSV File Import
9. Random Forest
10. SVM
11. Naive Bayes
12. Neural Network
13. Statistical analysis with different types of data.

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**SEMESTER- VI**

**COURSE CODE : - MJ-603T**  
**COURSE TITLE : - CYBER SECURITY**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks) No. of**

**Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$

*Total =* 60

**Module 1:** Cyber Security: Introduction of cyber security, History of cyber security, Types of cyber security, the importance of cyber security, Goals of cyber security

**Module 2:** Cyber Attacks: Classification of cyber-attacks, MITM attacks, Types of cyber-Attackers, Cyber security principles

**Module 3:** Data Security consideration: Backups, Archival of data and Disposal of data.

**Module 4:** Security Technologies: Firewall and VPN, Intrusion Detection, Access Control

**Module 5:** Security Threats to Ecommerce: electronic payments system, e-cash, data misuse, credit/debit card frauds; Security Policies: Need of security policies

**Module 6:** Cyber Security Standards, Cyber Security Digital Signature, Types of Digital Signature

**Module 7:** Cyber Security tools: Firewalls, anti-virus software, PKI Services, Managed detection and Response Service; Cyber Security challenges

**Module 8:** Cyber Security Risk Analysis, Benefits of Risk Analysis, Types of Risk Analysis, Email Security, Needs of Secure Email Service,

**Course Outcomes: -**

**After the completion of this course, students will be to:**

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1. Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.
2. Design, develop, test and evaluate secure software. Develop policies and procedures to manage enterprise security risks.
3. Construct a strategy to Safeguard the society from cybercrime.
4. Organize the evidence in terms of court terminology.
5. Define the legal issues and its applications.
6. Apply Computer forensics and digital detective and various processes, policies and procedures.
7. Compose the techniques to produce data from computer and hand held devices.

## Book Recommended

1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, Prentice Hall of India,
2. W. Stallings; Network Security Essentials: Applications and Standards,

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**SEMESTER- VI**

**COURSE CODE : - MJ-603P**  
**COURSE TITLE : - CYBER SECURITY**  
**CREDIT : - 1**

- 1) Introduction to data security
- 2) Configuring Endpoint Security
- 3) Common threats to a wireless network
- 4) Configuring a web browser
- 5) Email security concepts
- 6) Securing mobile platforms
- 7) Securing the cloud
- 8) Securing network connections
- 9) Using data destruction and disposal methods
- 10) Configuring file system security
- 11) Administering user and group accounts
- 12) Securing Windows
- 13) Configuring and running Windows Update
- 14) Configuring Firewall on Windows
- 15) Encryption
- 16) Data backup and disaster recovery
- 17) Implementing basic disaster prevention and recovery methods
- 18) Managing system maintenance tools
- 19) Social networking security
- 20) IM security

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**SEMESTER- VI**

**COURSE CODE : - MJ-604P**  
**COURSE TITLE : - PROJECT WORK**  
**CREDIT : - 4**

**Internal Assessment: 25 Marks**

**External Assessment: 75 Marks**

**PROJECT WORK/ DISSERTATION:**

1. The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.
2. Student have to do a complete project, the technologies (front end + back end) should be chosen among the syllabus, where the front end will be designing & coding portion and back end will be database portion.
3. Student have to run the code as a live project and submit CD containing supporting software, frontend and backend coding in proper format.

Guidelines to Examiners for

End Semester Examination (ESE Pr):

Project Evaluation (By Internal & External) may be as per the following guidelines:

Assigned by Internal Guide

Pre-Submission (Power Point Presentation) = 25 marks

Assigned by External Examiner

Programme Running in system = 40 marks

Project Report (Hard Copy) = 10 marks

Viva-voce = 25 marks

**PROJECT GUIDELINES**

Student must follow the below guidelines

1. Synopsis Submission
2. Synopsis Approval will be given within a week from the date of submission.
3. A Power Point presentation (based on the report) for the duration of 10 minutes should be make. This will be presented in front of Examiners.

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4. Faculty members will be the internal guide of each students.

5. Synopsis contains

- a) Title of the Project.
- b) Introduction of the Project.
- c) Objective of the Project.
- d) Platform used (Hardware/Software).
- e) Module of the project.
- f) Project Type
- g) System Design
  - I. Data Flow Diagram.
  - II. Entity-Relationship Diagram.
  - III. Object Diagram.
  - IV. Class Diagram.
  - V. Gantt and Pert Chart.
  - VI. Activity diagram.
  - VII. Collaboration diagram.
- h) Conclusion.
- i) Limitation of the Project.
- j) Future Scope of the Project.

6. Final Project Submission contains Hardcopy and Softcopy

Project Hardcopy contains

- a) Front page
- b) Certificate of Authenticity
- c) Certificate of Internship
- d) Declaration

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- e) Acknowledgement
- f) Table of content/index
- g) Project Guidelines
  - i. Introduction
  - ii. Vision, mission, objective
  - iii. Swot analysis
  - iv. Chronology of Achievements.
  - v. Topic discussion
  - vi. Platform used (Hardware/Software).
  - vii. Module of the project.
  - viii. Project Type
  - ix. System Design
    - a) Data Flow Diagram.
    - b) Entity-Relationship Diagram.
    - c) Object Diagram.
    - d) Class Diagram.
    - e) Gantt and Pert Chart.
    - f) Activity diagram
    - g) Collaboration diagram
  - x. Its relevance and implication in company.
  - xi. Finding
  - xii. Conclusion
  - xiii. Limitation of the project
  - xiv. Further Enhancement

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xv. Bibliography

7. Project that assigned to the student should be executed (run) during viva of project Dissertation.
8. Documentation of Synopsis/ Project must be well formatted.
9. Main text of Synopsis/ Project should be typed on A4 size paper in Font Times New Roman (Size 12) with margin: Left 1.5", Right: 1", Top: 1", Bottom: 1" and arranged in suitable sections like introduction, Problem Definition, Computational / Design, Results and Discussion, Conclusion, Future Scope of Work, References, Appendix (if any). The Project must be hard cover bound.
10. Contents of the final project also include coding and snapshot of the executed project.
11. Contents of the synopsis and final project must not copied from any website.

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**SEMESTER- VII**

**COURSE CODE : - MJ-701T**  
**COURSE TITLE : - PYTHON PROGRAMMING**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	<i>2 X 10 = 20</i>
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	<i>3 X 5 = 15</i>
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	<i>12.5X2 = 25</i>
		-----
<i>Total =</i>		<i>60</i>

**Module: 1** Introduction to Python Programming: Problem solving strategies; Structure of a Python program; Syntax and semantics; Python interpreter/shell, indentation; Executing simple programs in Python.

**Module: 2** Creating Python Programs: Identifiers and keywords; literals, numbers, and strings; Operators and expressions; Input and output statements; control structures (conditional statements, loop control statements, break, continue and pass), Errors and exception handling.

**Module: 3** User Defined Functions: Defining functions, passing arguments and returning values, default arguments

**Module: 4** Built-in data structures: Strings, Lists, Tuples, Sets, Dictionaries; their built-in functions, operators and operations.

**Book Recommended: -**

1. Kamthane, A. N., & Kamthane, A.A. Programming and Problem Solving with Python, McGraw Hill Education. 2017.
2. Balaguruswamy E., "Introduction to Computing and Problem Solving using Python", 2nd Edition, McGraw Hill Education, 2018.
3. Taneja, S., Kumar, N. Python Programming- A modular Approach. Pearson Education India, 2018.

Additional References

- (i) Guttag, J. V. Introduction to computation and programming using Python. MIT Press. 2018

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(ii) Downey, A. B. Think Python–How to think like a Computer Scientist 2nd Edition.  
O'Reilly  
2015

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**SEMESTER- VII**

**COURSE CODE : - MJ-701P**  
**COURSE TITLE : - LAB BASED ON PYTHON PROGRAMMING**  
**CREDIT : - 1**

**Suggested Practical List**

1. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of three subjects are to be input by the user. Assign grades according to the following criteria:

Grade A : if Percentage  $\geq 80$

Grade B : if Percentage  $\geq 60$  and Percentage  $< 80$

Grade C : if Percentage  $\geq 40$  and Percentage  $< 60$

Grade D : if Percentage  $\leq 40$

2. WAP to print factors of a given number.

3. WAP to add N natural numbers and display their sum.

4. WAP that takes a positive integer n and the produce n lines of output as shown:

\*

\* \*

\* \* \*

\* \* \* \*

(for n =4)

5. Write a menu driven program using user defined functions to print the area of rectangle, square, circle and triangle by accepting suitable input from user.

6. Write a function that calculates factorial of a number n.

7. WAP to print the series and its sum: (use functions)

$1/1! + 1/2! + 1/3! + \dots + 1/n!$

8. WAP to perform the following operations on an input string

a. Print length of the string

b. Find frequency of a character in the string

c. Print whether characters are in uppercase or lowercase

9. WAP to create two lists: one of even numbers and another of odd numbers. The program should demonstrate the various operations and methods on lists.

10. WAP to create a dictionary where keys are numbers between 1 and 5 and the values are the cubes of the keys.

11. WAP to create a tuple t1 = (1,2,5,7,2,4). The program should perform the following:

a. Print tuple in two lines, line 1 containing the first half of tuple and second line having the second half.

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**SEMESTER- VII**

**COURSE CODE : - MJ-702T**  
**COURSE TITLE : - COMPUTER MULTIMEDIA AND ANIMATION**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks) No. of**

**Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$

**Total = 60**

**Module 1:** Introduction: Definition Multimedia and uses, applications, Hardware and Software requirements, multimedia presentation and authoring tools, and multimedia, multimedia, animation techniques, shading, anti-aliasing, morphing: video on demand.

**Module 2:** Text and Graphics: Uses of text in multimedia, families and faces of fonts, outline fonts, bitmap fonts, international characters sets and hypertext digital font techniques. Graphics- Introduction, types, color and color models, color palettes, vector drawing, 3-D drawing and rendering, making still images, editing and capturing images.

**Module 3:** Audio and Video: Digital representation of sound, MIDI audio, MIDI vs. Digital Audio, Audio file formats, Adding sound to your multimedia project, Audio software and hardware, Video basic, how video works, broadcast video standard, Analog video, Digital video, shooting and editing video, video compression and file format.

**Module 4:** Animation and multimedia authoring: Introduction, principles, types and uses, cell animation, computer animations, morphing, Animation software compression techniques: need and types of compression- lossy and lossless, CODECs, authoring basic, types of authoring tools.

**Module 5:** Multimedia on the web: Introduction, Bandwidth, text on the web- Dynamic and embedded font technology, Audio and video on the web, buffering and streaming, webcasting, video conferencing.

**Books Recommended:-**

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1. Multimedia: Making It Work by Tay Vaughan, TataMcGraw-Hill
2. Computer Graphics and Multimedia by A. P. Godse, Technical Publication
3. Multimedia: An Introduction, Villamil and Molina, PHI
4. Sound and Video, Lozano. Multimedia, PHI

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## SEMESTER- VII

**COURSE CODE** : - **MJ-702P**  
**COURSE TITLE** : - **LAB BASED ON MULTIMEDIA AND ANIMATION**  
**CREDIT** : - **1**

### Suggested Practical List

1. Create an animated scene using the tools panel and the properties panel.
2. Create an animation using Free transform tool that should use
  - Move objects
  - Skew objects
  - Rotate objects
  - Stretch objects while maintaining proportion
3. Create an animation of Text using font, size, color and lighting effect.
4. Modify the document (changing background color etc.) using the following tools
  - Eraser tool
  - Hand tool
  - Ink bottle tool
  - Zoom tool
  - Paint Bucket tool
  - Eyedropper tool
5. Create an animated Flag
6. Create a scene to show animated walk and run cycles (using multiple layers and motion tweening)
7. Create an animation having an image having morphing effect.
8. Create an animation using (Shape Tweening and shape hints) for transforming one shape into another.
9. Create an animation of a cartoon picture using sound.
10. Create an animation of a character using key frames.

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11. Create an animation for a bouncing ball (use motion guide layer)
12. Create an animated scene of rain using the ripple effect.

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**SEMESTER- VII**

**COURSE CODE : - MJ-703T**  
**COURSE TITLE : - ENTREPRENEURSHIP DEVELOPMENT**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$

*Total =* 60

**Module 1:** Need, scope and characteristics of Entrepreneurship, special schemes for Technical Entrepreneurs, STED. Identification of opportunity. Exposure to demand based, resource based, service based, import substitute and export promotion Industries.

**Module2:** Market survey Techniques. Need scope and approaches for project formulation. Criteria for Principles of Product selection and development. Structure of project report.

**Module3:** Choice of technology, plant and equipment. Institutions, financing procedure and financial incentives. Financial ratio and their significance.

**Module4:** Books of accounts, financial statements and funds flow analysis. Energy requirement and Utilization. Resource Management Men, Machine and Materials.

**Module5:** Critical Path Method [CPM] and Project Evaluation Review Techniques [PERT] as planning tools for establishing SSI. a) Creativity and innovation. b) Strength weakness Opportunity and Threat [SWOT] Techniques.

**Module6:** Techno – economic feasibility of the project. Plant layout and Process Planning for the product. Quality control/quality assurance and testing of product.

**Module7:** Elements of Marketing and Sales management. a) Nature of product and market strategy b) Packaging and advertising. c) After Sales service. Costing and Pricing.

**Module8:** Management of self and understanding human behavior. Sickness in small scale industries and their remedial measures. Coping with uncertainties, stress management and positive reinforcement.

a) Licensing , registration. b) Municipal bye laws and insurance coverage. Important provisions of factory Act, Sales of Goods Act, Partnership Act. a) Dilution control b) Social responsibility and business ethics. Income Tax, Sales Tax and Excise Rules.

Books Recommended:

Entrepreneurship Development: S.B. Khanka, EDP – Khanka and Gupta

EDP – Khanka and Gupta

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## SEMESTER- VII

**COURSE CODE** : - **MJ-703P**  
**COURSE TITLE** : - **LAB BASED ON EDP**  
**CREDIT** : - **1**

### **PRACTICAL: EDP**

1. Conduct of mini market survey, Data collection through questionnaire and personal visits.
2. Analysis of simple project reports, communication written and oral practices
3. Case study on any technology related interventions or innovation like fintech, EdTech etc.

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**SEMESTER- VII**

**COURSE CODE : - MJ-704T**  
**COURSE TITLE : - E-COMMERCE AND APPLICATION**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	<i>2 X 10 = 20</i>
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	<i>3 X 5 = 15</i>
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	<i>12.5X2 = 25</i>
		-----
<i>Total =</i>		<i>60</i>

- Module 1:** Introduction to e-commerce, Advantages and Disadvantage of Ecommerce, Types of E-Commerce EDI-electronic data interchange, Benefits of EDI, Component of EDI System.
- Module 2:** Introduction to UN/EDIF ACT standard, An EDIFACT Message, Interchange Structure, Un/EDIFACT message Directories.
- Module 3:** Internet & Extranets, Commerce over the Internet, Commerce over the Extranet Identification & tracking tools, EAN system, Eancom, Article numbering, bar Coding.
- Module 4:** Business process Re-engineering, Strategic Alignment Model BPR Methodology. Rapid Re Methodology, Management of change.
- Module 5:** Concerns for e-commerce growth – Legal issues, Risks, Technology for Authenticating Electronics Document, Laws for E-Commerce, Legal issues for internet commerce.
- Module 6:** Cyber security, Cyber-attacks, Hacking, Firewalls, cryptography-based solutions, Digital Signature
- Module 7:** Information Technology act 2000, Public Key Infrastructure, PKI and Certifying Authorities
- Module 8:** Electronic payment system, Payment gateway and Internet banking, Pay pal, Secure Electronic Transaction (SET) protocol

**Course Outcomes: -**

**After the completion of this course, students will be to:**

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1. Focuses on the three major driving forces that permeate all aspects of e-commerce:
2. business development and strategy,
3. Technological innovations, and social and legal issues and impacts.
4. Covers E-commerce technology infrastructure
5. Business concepts,
6. social issues and real world experiences.

## Books Recommended:

- 1.K. K. Bajaj & D. Nag – TMH
- 2.Rayport & Jawors

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## SEMESTER- VII

**COURSE CODE : - MJ-704P**  
**COURSE TITLE : - LAB BASED ON E-COMMERCE**  
**CREDIT : - 1**

1. Is It a Good Idea to Sell Hardware Tools Online?
2. Will People Buy Ice Cream Online?
3. O'Reilly to Move Electronic Components Catalog Online
4. Case Industry Overview: Online Services and Storage
5. Amazon Buys Video-game Streaming Site Twitch for \$970M

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**SEMESTER- VIII**

**COURSE CODE : - MJ-801T**  
**COURSE TITLE : - DIGITAL IMAGE PROCESSING**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

Group-A: Objective questions (Compulsory)	:	2 X 10 = 20
Group-B: short type questions (3 out of 5 questions)	:	3 X 5 = 15
Group-C: Descriptive Type Questions (2 out of 4 questions)	:	12.5X2 = 25
		-----
Total =		60

**Module 1: Fundamentals**

Need for DIP- Fundamental steps in DIP – Elements of visual perception -Image sensing and Acquisition – Image Sampling and Quantization – Imaging geometry, discrete image mathematical characterization.

**Module 2: Image Transforms**

Two-dimensional Fourier Transform- Properties – Fast Fourier Transform – Inverse FFT, Discrete cosine transform and KL transform. -Discrete Short time Fourier Transform- Wavelet Transform- Discrete wavelet Transform- and its application in Compression.

**Module 3: Image Enhancement**

**Spatial Domain:** Basic relationship between pixels- Basic Gray level Transformations – Histogram Processing – Smoothing spatial filters- Sharpening spatial filters. **Frequency Domain:** Smoothing frequency domain filters- sharpening frequency domain filters Homomorphic filtering.

**Module 4: Image Restoration:**

Overview of Degradation models –Unconstrained and constrained restorations-Inverse Filtering, Wiener Filter.

**Module 5: Feature Extraction:**

Detection of discontinuities – Edge linking and Boundary detection- Thresholding- -Edge based segmentation-Region based Segmentation- matching-Advanced optimal border and surface detection- Use of motion in segmentation. Image Morphology – Boundary descriptors- Regional descriptors.

**Module 6: Image Reconstruction from Projections:**

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Need- Radon Transform – Back projection operator- Projection Theorem- Inverse Radon Transform.

## **Book Recommended: -**

1. Rafael C.Gonzalez & Richard E.Woods – Digital Image Processing – Pearson Education- 2/e – 2004.
2. Anil.K.Jain – Fundamentals of Digital Image Processing- Pearson Education-2003.

## **Reference Books:**

1. B.Chanda & D.Dutta Majumder – Digital Image Processing and Analysis – Prentice Hall of India – 2002
2. William K. Pratt – Digital Image Processing – John Wiley & Sons-2/e, 2004

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**SEMESTER- VIII**

**COURSE CODE : - MJ-801P**  
**COURSE TITLE : - LAB BASED ON DIGITAL IMAGE PROCESSING**  
**CREDIT : - 1**

1. Simulation and Display of an Image, Negative of an Image(Binary & Gray Scale)
2. Implementation of Relationships between Pixels
3. Implementation of Transformations of an Image
4. Contrast stretching of a low contrast image, Histogram, and Histogram Equalization
5. Display of bit planes of an Image
6. Display of FFT(1-D & 2-D) of an image
7. Computation of Mean, Standard Deviation, Correlation coefficient of the given Image
8. Implementation of Image Smoothing Filters(Mean and Median filtering of an Image)
9. Implementation of image sharpening filters and Edge Detection using Gradient Filters
10. Image Compression by DCT, DPCM, HUFFMAN coding
11. Implementation of image restoring techniques
12. Implementation of Image Intensity slicing technique for image enhancement
13. Canny edge detection Algorithm

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**SEMESTER- VIII**

**COURSE CODE : - RC-801T**  
**COURSE TITLE : - Research Methodology**  
**CREDIT : - 12**

B. Sc. (Research Course) Information Technology, Semester- VIII, Credit-12  
Research Methodology (RC-801T)

Time: 3 Hours

Full Marks for End Semester: 75

Internal Assessment: 25 Marks (Mid Sem.-20 & Assignment Work-5Marks)

**No. of Lectures: 60**

Instructions to external question setter for end semester examination (75 Marks): There will be three section of questions section A will be very short answer type questions consisting of 05 compulsory questions carrying 1 mark each. Again, section B will be short answer type questions wherein two questions are to be answered four questions are to be answered out of six questions carrying fifteen marks each.

**UNIT I**

Research process & Problem: Concept, step and function & significance of research in information technology, meaning and type of research, Research problem: identification and techniques, Literature survey, Research methods, qualitative research, aims and objective of research, formulation and testing of hypotheses.

**UNIT II**

Research design & Data election: Meaning purpose, principles of research design, research proposal types of data and their sources, methods of data collection, graphics and diagrammatic presentation of data, data collection tools, sampling, measurement scales, variables.

**UNIT III**

Statistical Analysis: Measures of central tendency, measures of dispersion, measures of relationship, combinational analysis, measures of disparity, sopher's index and composite index, measures o of inequality, parametric and non-parametric test, t-test test, Z test, Chi-square test.

**UNIT IV**

Data interpretation and analysis: Editing Coding Classification and Tabulation: Preparation of

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Charts and graphs through MS-Excel Statistical data processing and data analysis through SPSS,

**UNIT-V**

Report writing: Report writing and presentation of results, Title page, Declaration and Certificate

page. Acknowledgement Contents List of tables, figures & abbreviation, Chapters of the thesis footnotes, References & Bibliography, Appendices

Recommended books: -

1. Adams, J. H.T. A Khan & Raeside (2014) Research Methods for Business and social Science Student SAGE, New Del Ale, & (2014) Kesh Method, Rawat Publications, New Delhi
2. Best, J.W. J.V. Kalin & AK (2017) Rosh in Education Parson, Noida
3. Chawla D. & Neon Sunidhi (2016) Research Methodology Concepts and Cases Vikas Publishing House PVT. LTD. Noida.
4. Dooley (2008): Social Research Methods, Prentice-Hall of India Private Limited, New Delhi
5. Fox. (1997): Applied Regression Analysis, Linear models and Related Methods, Sage Publications, New Delhi.

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## SEMESTER- VIII

<b>COURSE CODE</b>	<b>: -</b>	<b>RC-802T</b>
<b>COURSE TITLE</b>	<b>: -</b>	<b>Research Proposal</b>
<b>CREDIT</b>	<b>: -</b>	<b>12</b>

**B. Sc. (Research Course) Information Technology, Semester- VIII, Credit-12**  
**Research Methodology (RC-802T)**

Time: 3 Hours

Full Marks for End Semester: 75

**Internal Assessment: 25 Marks (Mid Sem.-20 & Assignment Work-5Marks)**

**No. of Lectures: 60**

Learning outcome: -

1. As with literature survey, research problem, variable, objective, hypothesis and research proposal.
2. Makes use of proper tools and surveying methods for measurement in context of collection and processing of data.
3. Familiarize the art of the research methodology, methods and techniques.

## Course Structure

Preparation of Research Proposal Sprogs under the supervision of a distinguished Professor of University Department of information technology and presentation of synopsis before the full bench of Departmental Research Council and Ph.D. scholars a pre-dissertation Seminar. The research proposal must include introduction, Origin of Problem, Objective, Hypothesis, Sources & Method Data collection, Research design & Methodology, area of study, Significance of study, Relevance for society, Contribution to existing knowledge, Future work and small list of References. Besides this, the paper will also be evaluated on the basis of performance under the heading of Review of Literature, Progress in field-work and Laboratory work for research purposes. Lastly, both Research Proposal (RC-2) and Research Report (RC-3) will be evaluated by the External Examiners in one

### Recommended Book

Aja, Ram 250, Research Methods. Raw Publications, Jaipur and New Delhi.

Lofland, J and Lofland, L.H 1995 analysis social setting, A guide to qualitative observation and analysis , Wadsworth, Belmont, CA

Oxford University Press, Make T Kitchen, Rob and Faller, Duncan 2006. The Academic's Guide to Publishing New Delhi(Sage)

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**SEMESTER- VIII**

**COURSE CODE : - RC-803T**  
**COURSE TITLE : - Research Report**  
**CREDIT : - 12**

B. Sc. (Research Course) Information Technology, Semester- VIII, Credit-12  
Research Methodology (RC-803T)

Time: 3 Hours

Full Marks for End Semester: 75

Internal Assessment: 25 Marks (Mid Sem.-20 & Assignment Work-5Marks)

**No. of Lectures: 60**

Learning Outcomes:

1. Acquaint with literature survey, research problem, variable, objective, hypothesis and research proposal
2. Make use of proper tools and surveying methods for measurement in context of collection and processing of data
3. Familiarize the art of research methodology, methods and techniques.

Course Structure:

The research report/ dissertation must contain Title page, Declaration and Certificate page, Acknowledgement, List of tables, figures & abbreviations, Contents, Introduction, Research design & methodology, Results, Discussion, Chapters of dissertation, Conclusion, References and Appendices. A Dissertation must be presented for examination in a final form in print on A 4 size paper with 12- point font and line spacing of 1.5 containing approximately 125 pages with one-inch margins all around in hard-bound form. Illustrations and tables should be preferably placed exactly where they are to appear within the text. All dissertation pages, footnotes, equations and references should be labelled in consecutive numerical order. Lastly, both Research Proposal (RC-2) and Research Report (RC-3) will be evaluated by the External Examiners in one sitting.

Recommended Books:

Ahuja, R. (2014): Research Methods, Rawat Publications, New Delhi. Best, J.W., J. V. Kahn & A. K. Jha (2017): Research in Education, Pearson, Noida.

Kerlinger, F. N. (2021); Foundations of Behavioural Research, Surjeet Publications, Delhi.

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Kothari, C. R. (2004): Research Methodology: Methods & Techniques, New Age International Publishers, New Delhi.

Kumar, R. (2009): Research Methodology: A Step-By-Step Guide for Beginners, Pearson, New Delhi.

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**SEMESTER- VIII**

**COURSE CODE : - MJ-801T**  
**COURSE TITLE : - ARTIFICIAL INTELLIGENCE**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks)**

**No. of Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$
		-----
<i>Total =</i>		<b>60</b>

**Module 1:** Introduction: Objective, scope and outcome of the course, Meaning and definition of artificial intelligence, Physical Symbol System Hypothesis, production systems, Characteristics of production systems. Breadth first search and depth first search techniques. Heuristic search Techniques: Hill Climbing, Iterative deepening DFS

**Module 2:** Breadth first search and depth first search techniques. Heuristic search Techniques: Hill Climbing, Iterative deepening DFS

**Module 3:** Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic logical consequences, syntax and semantics of an expression, semantic Tableau Nonvolatile data

**Module 4:** Network-based representation and reasoning, Semantic networks, Conceptual Graphs, frames. Description logic (DL), concept language, reasoning using DL. Conceptual dependencies (CD), scripts, reasoning using CD. Introduction to natural language processing. Automated planning, classical planning problem, forward planning, partial order planning, planning with proposal logic, hierarchical task planning, multiagent planning.

**Module 5:** Automated planning, classical planning problem, forward planning, partial order planning, planning with proposal logic, hierarchical task planning, multiagent planning.

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**Module 6:** Reasoning in uncertain environments, Fuzzy logic, fuzzy composition relation, operations on fuzzy sets

**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Analyze the principles and approaches of artificial intelligence and understand different aspects of Intelligent agent.
2. Apply different search techniques for solving real world problems and select the most appropriate solution by comparative evaluation.
3. Analyze the various concepts of knowledge representations and demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.
4. Develop a basic understanding of some of the more advanced topics of AI

**Book Recommended:**

1. Artificial Intelligent : Elaine Rich, Kevin Knight, Mc-Graw Hill.

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**SEMESTER- VIII**

**COURSE CODE : - MJ-801P**  
**COURSE TITLE : - LAB BASED ON AI**  
**CREDIT : - 1**

1. Write a program to calculate the sum of two numbers.
2. Write a program to find the maximum of two numbers.
3. Write a program to find the nth Fibonacci series.
4. Write a program to find the factorial of a number.
5. Write a program to implement GCD of 2 numbers.
6. Write a program to implement palindrome.
7. Write a program to implement reverse (list, reversed list) that reverses list.
8. Write a program to implement append for two list.
9. Write a program to implement palindrome (List).

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**SEMESTER- VIII**

**COURSE CODE : - MJ-802T**  
**COURSE TITLE : - INTERNET OF THINGS**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks) No. of**

**Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	<i>2 X 10 = 20</i>
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	<i>3 X 5 = 15</i>
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	<i>12.5X2 = 25</i>
		-----
<i>Total =</i>		<i>60</i>

**Module 1:** IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

**Module 2:** IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACnet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

**Module 3:** IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models-.

**Module 4:** WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.

**Module 5:** IOT APPLICATIONS - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc

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**Books Recommended :** Text: • Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.

• Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.

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**SEMESTER- VIII**

**COURSE CODE : - MJ-802P**  
**COURSE TITLE : - LAB BASED ON IOT**  
**CREDIT : - 1**

- 01 Sense the Available Networks Using Arduino
- 02 Measure the Distance Using Ultrasonic Sensor and Make Led Blink Using Arduino
- 03 Detect the Vibration of an Object Using Arduino
- 04 Connect with the Available Wi-Fi Using Arduino
- 05 Sense a Finger When it is Placed on Board Using Arduino
- 06 Temperature Notification Using Arduino
- 07 LDR to Vary the Light Intensity of LED Using Arduino

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**SEMESTER- VIII**

**COURSE CODE : - MJ-803T**  
**COURSE TITLE : - CLOUD COMPUTING**  
**CREDIT : - 3**

**Time: 3 hours**

**Full Marks for End Semester: 60**

**Internal Assessment: 15 Marks (Mid Sem -10 & Assignment Work-5 Marks) No. of**

**Lectures: 45**

**Instruction to Question Setter for End Semester Examination (ESE 60 marks):**

<i>Group-A: Objective questions (Compulsory)</i>	:	$2 \times 10 = 20$
<i>Group-B: short type questions (3 out of 5 questions)</i>	:	$3 \times 5 = 15$
<i>Group-C: Descriptive Type Questions (2 out of 4 questions)</i>	:	$12.5 \times 2 = 25$
		-----
<i>Total =</i>		<b>60</b>

**Module 1:** Overview of Computing Paradigm, Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing.

**Module 2:** Introduction to Cloud Computing: Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing

**Module 3:** Cloud Computing Architecture: Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), How Cloud Computing Works, Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud.

**Module 4:** Service model using Google App Engine,

**Module 5:** Service Management in Cloud Computing. Service Level Agreements (SLAs), Billing & Accounting,

**Module 6:** Cloud Security Infrastructure Security- Network level security, Host level security, Application-level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

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**Course Outcomes: -**

**After the completion of this course, students will be to:**

1. Recall the various aspects of cloud computing and distributed computing,
2. Understand the specifics of virtualization and cloud computing architectures.
3. Develop and deploy cloud application using services of different cloud computing technologies provider:
4. Google app Engine, Evaluate the security and operational aspects in cloud system design,
5. identify and deploy appropriate design choices when solving real-world cloud computing problems.
6. Provide recommendations on cloud computing solutions for a Green enterprise.

**Books Recommended :-**

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

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**SEMESTER- VIII**

**COURSE CODE : - MJ-803P**  
**COURSE TITLE : - LAB BASED ON CLOUD COMPUTING**  
**CREDIT : - 1**

List of experiments:

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms .
3. Working on tools used in cloud computing online- a) Storage b) Sharing of data c) manage your calendar, to-do lists, d) a document editing tool
4. Exploring Google cloud
5. Exploring Microsoft cloud
6. Exploring amazon cloud

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## SEMESTER-I

**COURSE CODE** : - SEC-101T  
**COURSE TITLE** : - Soft Skills  
**CREDIT** : - 3

**Module- I** - SELF ANALYSIS SWOT Analysis, who am I, Attributes, Importance of Self Confidence, Self Esteem.

**Module-2** - CREATIVITY Out of box thinking, Lateral Thinking.

**Module-3**- ATTITUDE Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette.

**Module-4**- MOTIVATION Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators.

**Module-5**- GOAL SETTING Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management Value of time, Diagnosing Time Management, Weekly Planner to do list, Prioritizing work. Extempore ASSESSMENT

**Module-6**- INTERPERSONAL SKILLS Gratitude Understanding the relationship between Leadership Networking & Team work. Assessing Interpersonal Skills Situation description of Interpersonal Skill. Team Work: Necessity of Team Work Personally, Socially and Educationally.

**Module-7** - LEADERSHIP Skills for a good Leader, Assessment of Leadership Skills,

**Module-8** - STRESS MANAGEMENT Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters. Emotional Intelligence what is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions.

### TEXT BOOK:

SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.

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**SEMESTER-II**

**COURSE CODE** : - **SEC-201T**  
**COURSE TITLE** : - **Organizational Behavior**  
**CREDIT** : - **3**

**Module-1 Introduction:** Meaning and importance of the study of OB

**Module-2 Behaviour and its causation:** Introduction to personality, perception, learning and attitude

**Module-3 Motivation:** Importance of psychological process of motivation, salient motivation tools Need Theories/ Content Theories (Maslow's Hierarchy of Needs, Alderfer's ERG Theory Process Theories (Herzberg's Two Factor Theory and Vroom's Expectancy Theory)

**Module-4 Leadership and Group Dynamics:** Historically Important (Ohio State and Michigan leadership Theories), Traditional Theories (Trait Theory and Contingency Theory) Modern Theories (Charismatic Theories), Formal and informal groups, role concept

**Module-5 Improving Interpersonal Effectiveness:** Interpersonal communication, Introduction to TA

**Module-6 Conflict Management and Team Building:** Sources of Conflict, Types of Conflict, Negotiation (process and issues).

**Module-7 Concepts of Organizational Culture and Organizational Development:** Definition, Organizational Culture

**Module-8 Organizational Development:** Concept of OD, Phases of OD and OD Interventions, Limitations of OD Interventions Concept of Morale and Job Satisfaction.

**Text Books:**

1. Pareek, U. Understanding Organizational Behaviour (Oxford University Press: New Delhi)
2. Robbins, S.P.& Sanghi Organizational Behaviour (Prentice Hall India: New Delhi)

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**SEMESTER-III**

**COURSE CODE : - SEC-301T**  
**COURSE TITLE : - Management Information System**  
**CREDIT : - 3**

**Module 1:** Overview of MIS, Significance of MIS, explain management, information and system, nature, scope characteristics of MIS, Comparing information IT with MIS

**Module 2:** Structure of MIS on the basis of physical components, support for decision making, classification of MIS- (Transaction processing system, management information system decision support system, office automation system)

**Module:3** Functional Information System-financial information system, marketing information system, production/manufacturing information system

**Module :4** Decision Making Type-purpose of decision making, Simon's model of decision-making

Decision tree

**Module:5** Information and system concepts-types of information-strategic information, operational information, definition of system, element of system-input, process, output, feedback

**Module :6** System development approaches-Spiral model, water fall model

**Module 7:** System analysis-introduction to system analysis, determination of requirements, identify the data used and information evolution of mis- evolution approaches, evolution classes, product-based mis evolution, cost/benefit-based evolution.

**Books Recommended: Management Information System – Javedkar**

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