

NEP-2020 Aligned Curriculum for

Diploma Programme in

INFORMATION TECHNOLOGY

For the State of Uttar Pradesh

(5th to 6th Semester)

Semester System



Prepared By:

INSTITUTE OF RESEARCH DEVELOPMENT & TRAINING, U.P., KANPUR

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1 . SALIENT FEATURES

- 1) Name of the Programme : Diploma Programme in Information Technology
- 2) Duration of the Programme : Three years (Six Semesters)
- 3) Entry Qualification : Matriculation or equivalent NEP-2020/NSQF Level-4 as Prescribed by State Board of Technical Education, U.P.
- 4) Pattern of the Programme : Semester Pattern
- 5) NSQF Level : Level - 5
- 6) Ratio between Theory and Practical : 40: 60 (Approx.)

7) Industrial Training

Four and six weeks of industrial training is made mandatory after the II and IV semesters during summer vacation. Total marks allotted to industrial training will be respectively 50 & 100.

In the last (6th Semester) we have made the one semester Industrial training/Internship as optional along with usual classroom training.

8) Ecology and Environment

As per Govt. of India directives a subject on Environmental Science has been incorporated in the curriculum.

9) Entrepreneurship and Start-ups

A full subject Entrepreneurship & Start-ups has been incorporated in the curriculum.

10) Student Centred Activities

A provision of 2-4 hrs per week has been made for organizing Student Centered Activities for overall personality development of students. Such activities will comprise of co-curricular activities such as expert lectures, self-study, games, hobby classes like photography, painting, singing etc. seminars, declamation contests, educational field visits, NCC, NSS, library and other cultural activities.

11) Project work

A project work has been included in the curriculum to enable the student get familiarize with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry.

2- PROGRAM OUTCOMES (POs)

PO1: Basics and Discipline specific Knowledge

Assimilate knowledge of basic mathematics, science, engineering fundamentals.

PO2: Problem's Analysis and solution

Identify, analyse and solve problems using standard methods and established techniques.

PO3: Design and Development

Design solutions for technical problems.

Assist in designing components, systems, or processes to meet specific requirements.

PO4: Engineering Tools, Experimentation, and Testing

Use modern engineering tools and appropriate techniques to conduct experiments as per BIS standard.

PO5: Socio/ Economic /Environmental impact assessment/remedy.

Apply relevant technologies while considering societal needs, environmental impact keeping in view sustainable and ethical responsibilities.

PO6: Project Management and Communication

Apply engineering management principles, work effectively as an individual or in a team, and communicate clearly on activities.

PO7: Lifelong Learning

Recognize the importance of continuous learning and actively pursue self-improvement to keep pace with technological developments.

6- STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN INFORMATION TECHNOLOGY

**NOTE: I & II Sem. is common to all engineering & technology branches and implemented from the session 2024-2025
FIFTH SEMESTER (INFORMATION TECHNOLOGY)**

Sr. No.	SUBJECTS	Category & Course Type	STUDY SCHEME			Credits(C) (L+T)+P = C	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
			L	T	P			Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
5.1	Object oriented programming using Java	Prog Core (Practicum)	1	-	4	1+2=3	-	60	60	-	-	40	03	40	100		
5.2	System Administration	Prog Core (Practicum)	1	-	4	1+2=3	-	60	60	-	-	40	03	40	100		
5.3	Program Elective -2	Prog Elective (Practicum)	3	-	4	3+2=5	40	-	40	60	03	-	03	60	100		
5.4	Program Elective -3	Prog Elective (Practicum)	3	-	4	3+2=5	40	-	40	60	03	-	03	60	100		
5.5	(Q) Open Elective-2	Open Elective (Theory)	2	-	-	2	50*	-	50*	-	-	-	-	-	-		
	*Advance Skill Development	Open Elective Certification Course	-	-	-		-	-	-	-	-	-	-	-	-		
5.6	**Summer Internship -II (4 Weeks after 4th Sem.)		-	-	-	2	-	60	60	-	-	40	03	40	100		
5.7	(Q) Indian Constitutions	Audit Courses	2	-	-	-	50*	-	50*	-	-	-	-	-	-		
Student Centered Activities (SCA)			-	-	8	-	-	50	50	-	-	-	-	-	50		
Total			12		24	20	80	230	310	120		120		240	550		

(Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.

** Students will submit the certificate. Students will present a seminar/viva on their summer internship / *ADVANCE SKILL CERTIFICATION along with certificate, project and report.

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, library, Cultural Activities and self-study etc. The periods allotted to SCA can also be utilized to complete the syllabus for other subjects.

SIXTH SEMESTER (INFORMATION TECHNOLOGY)

NORMAL PATHWAY

Sr. No.	SUBJECTS	Category & Course Type	STUDY SCHEME Periods/Week			Credits(C) (L+T)+P = C	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMEN							
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
6.1	Entrepreneurship and Start-ups	Humanities & Social Science (Theory)	2	-	-	2+0=2	40	-	40	60	03	-	-	60	100		
6.2	Program Elective-4	Program Elective-4	4	-	-	4+0=4	40	-	40	60	03	-	-	60	100		
6.3	In House Project	Project	4	-	16	12	-	240	240	-	-	160	-	160	400		
6.4	(Q) Open Elective-3 OR	Open Elective (Theory)*	2	-	-	2	50*	-	50*	-	-	-	-	-	-		
	Advance Skill Development	(certification Course)					-	-	-	-	-	-	-	-	-		
Student Centered Activities (SCA)			-	-	8	-	-	50	50	-	-	-	-	-	50		
Total			12	-	24	20	80	290	370	120	-	160	-	280	650		

NOTE: -

1. (Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.
2. *Advance skill development mention at 6.4 in the table provides the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agencies of repute of duration not less than 20 Hrs. (Offline/Online).
3. The above scheme can be customized as per the specific requirements of the respective courses.
4. # Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, library, Cultural Activities and self-study etc. The periods allotted to SCA can also be utilized to complete the syllabus for other subjects.

OR

INDUSTRIAL PATHWAY

(6th Sem.)

Sr. No.	SUBJECTS	Category & Course Type	STUDY SCHEME			Credits(C) (L+T)+P=C	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External	Assessment
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT								
L	T	P	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot								
6.1	Entrepreneurship and Start-ups (ONLINE Mode)	Humanities & Social Science (Theory)	-	-	-	2	-	-	-	100	03	-	-	100	100	Theory		
6.2	Industrial Hands On Practice	Industrial Training	-	-	-	12	150*			200**					350			
6.3	Industrial Project	Industrial Training	-	-	-	4	50*			50**					100			
6.4	# Seminar	In House	-	-	-	2	-	100	100	-	-	-	-	-	100			
Total			-	-	-	20	-							-	650			

NOTE:

1. The Industrial training tenure should not be less than 14 Weeks.
2. Industry must be registered with MSME / Directorate of industries/Limited Organization/ State/Central Government establishments.
3. Monthly progress reports of Intern/ Trainee should be attested and forwarded by industrial supervisor (allotted to Intern/Trainee) during industrial Internship/Training.
4. The Industrial unit/organisation must evaluate students using the format provided by polytechnic in the form of marks.
5. The Industrial Hands on Practice, Industrial Project and seminar must be evaluated on the basis of the AICTE Internship Policy: Guidelines and procedures (Chapter -9 Procedures / format for organizing internship)
6. **“Entrepreneurship and Start-up”** course is also mandatory in Industrial internship/training mode. It will be conducted online mode by his/her polytechnic institute. After completing the online course, students must appear for exam conducted by the Board of Technical Education, Lucknow.

7. *Evaluation by faculty mentor

The institute will depute one faculty member for mentoring at least 20-30 students undertaking apprenticeship training. Such mentors will monitor, guide and provide counselling to the students as and when required. Faculty mentor of the institute(s) may make a surprise visit to the internship/apprenticeship site to check the student's presence physically. (The Proforma of the evaluation is attached as the Annexure -1)

8. **** Evaluation by industry** : The industry shall assess the candidates based on the following parameters attendance, discipline and punctuality, familiarity of tools and material, engineering skills, application of knowledge and problem-solving skills, comprehension and observation, professional ethics, safety and environmental consciousness, communication skills, supervisory skills and general conduct during the period (The Proforma of the evaluation is attached as the Annexure -2)

9. **# Evaluation through seminar presentation/Viva-Voce at the institute** : The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria .

ANNEXURE 1

LIST OF COURSES CONDUCTED BY TATA TECHNOLOGIES

1. Fundamentals of Innovation and Design Thinking
2. Product Design and Development
3. Product Verification and Analysis
4. Advanced Automobile
5. Electric Vehicle
6. Internet of Things
7. Advanced Manufacturing
8. Advanced Welding & Painting using Simulator
9. Industrial Automation and MES
10. Industrial Robotics
11. Inspection and Quality Control
12. Advanced Plumbing
13. AI and ML

LIST OF PROGRAM ELECTIVE COURSES (PE-2)

Sr No	Course Title	L	T	P	C
1	Data Science and Machine Learning	3	-	4	5
2	Fundamental of Artificial intelligence	3	-	4	5

LIST OF PROGRAM ELECTIVE COURSES (PE-3)

Sr No	Course Title	L	T	P	C
1	Network Forensics	3	-	4	5
2	Software Testing	3	-	4	5

LIST OF PROGRAM ELECTIVE COURSES (PE-4)

Sr No	Course Title	L	T	P	C
1	Information Security and IT Law	4	-	-	4
2	FOSS(Free and Open Source Software)	4	-	-	4

LIST OF OPEN ELECTIVE COURSES (OE-2)

Sr No	Course Title	L	T	P	C
1	Product Design	2	-	-	2
2	Engineering Economics & Accountancy	2	-	-	2
3	Artificial Intelligence and Machine Learning (TATA)	2	-	-	2

LIST OF OPEN ELECTIVE COURSES (OE-3)

Sr No	Course Title	L	T	P	C
1	Disaster Management	2	-	-	2
2	Renewable Energy Technology	2	-	-	2

OPEN ELECTIVE's

SR.NO.	CERTIFICATE COURSES
1.	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc Refer Annexure 1)
2.	COURSES CONDUCTED BY INFOSYS SPRINGBOARD
3.	COURSES CONDUCTED BY TCS ION
4.	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL ORGANIZATION OR PLATFORMS OF REPUTE
5.	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
6.	COURSES CONDUCTED BY C-DAC
7.	COURSES CONDUCTED BY NEILIT

7- DETAILED CONTENT

FIFTH SEMESTER

5.1 Practicum	Object Oriented Programming Using Java	L	T	P
		1	-	4

COURSE OBJECTIVES

This course offers the modern programming language JAVA that will help the students to implement the various concept of object orientation practically. The students will be able to program in the object oriented technology with the usage of JAVA.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO 1: Install Java IDE, Compiler, Java virtual machines and understand basic concepts of Java

CO 2: Implement basic Java programs

CO 3: Explain and implement the concept of Object-oriented Programming

CO 4: Explain and implement Abstract class, Interface and Polymorphism using Java program.

CO 5: Understand Exceptions and develop multithreaded programs

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	-	2	-	-	2	*	*
CO2	2	2	2	3	-	1	2	*	*
CO3	3	3	3	2	-	1	2	*	*
CO4	3	3	3	2	-	1	2	*	*
CO5	3	3	3	3	-	2	2	*	*

COURSE CONTENTS

UNIT 1: Introduction and Features

(2 Periods)

Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP), Object oriented programming concepts – Classes, object, object reference, abstraction, encapsulation, inheritance, polymorphism, Introduction of eclipse (IDE) for developing programs in Java

UNIT 2: Language Constructs

(3 Periods)

variables, data types : Integer, floating point type, character, boolean operators, iteration and jump statement, conditional expressions, input using scanner class and output statement, loops, switch case, arrays, introduction to methods.

UNIT 3: Classes and Objects:

(3 Periods)

Class fundamentals, constructors, declaring objects (Object & Object Reference), creating and accessing variables and methods, static and non static variables/methods defining packages, Creating and accessing a package, Importing packages, Understanding CLASSPATH, auto boxing , String , String Buffer.

Inheritance :Definition of inheritance, protected data, private data, public data, constructor chaining, order of invocation, types of inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance , access control (Private Vs Public Vs Protected Vs Default)

UNIT 4: Abstract Class, Interface and Polymorphism

(3 Periods)

Defining an interface, Key points of Abstract class & interface, difference between an abstract class & interface, implementation of multiple inheritance through interface.

Method and constructor overloading, method overriding, up-casting and down-casting.

UNIT 5: Exception Handling and Multithreading

(3 Periods)

Definition of exception handling, implementation of keywords like try, catches, finally, throw & throws, built-in exceptions, difference between multi threading and multi tasking, thread life cycle, creating threads, thread priorities.

LIST OF PRACTICALS

1. WAP to create a simple class to find out the area and perimeter of rectangle and box using super and this keyword.
2. WAP to design a class account using the inheritance and static that show all function of bank (withdrawal, deposit).
3. WAP to design a class using abstract methods and classes.
4. WAP to design a string class that perform string method (equal, reverse the string, change case).
5. Consider we have a Class of Cars under which Santro Xing, Alto and Wagon R represents individual Objects. In this context each Car Object will have its own, Model, Year of Manufacture, Colour, Top Speed, etc. which form Properties of the Car class and the associated actions i.e., object functions like Create(), Sold(), display() form the Methods of Car Class.
6. In a software company Software Engineers, Sr. Software Engineers, Module Lead, Technical Lead, Project Lead, Project Manager, Program Manager, Directors all are the employees of the company but their work, perks, roles, responsibilities differs. Create the Employee base class would provide the common behaviors of all types of employee and also some behaviors properties that all employee must have for that company.
7. Using the concept of multiple inheritance create classes: Shape, Circle, Square, Cube, Sphere, Cylinder. Your classes may only have the class variable specified in the table below and the methods Area and/or Volume to output their area and/or volume.

Class	Class Variable	Constructor	Base class
Shape	String name	Shape()	
Circle	double radius	Circle(double r, String n)	Shape
Square	double side	Square(double s, String n)	Shape
Cylinder	double height	Cylinder(double h, double r, String n)	Circle
Sphere	None	Sphere(double r, String n)	Circle
Cube	None	Cube(double s, String n)	Square

8. WAP to handle the exception using try and multiple catch block.
9. WAP that implement the Nested try statements.
10. WAP to create a package that access the member of external class as well as same package.
11. WAP that show the partial implementation of interface.
12. WAP to create a thread that implement the Runnable interface.

RECOMMENDED BOOKS

1. Programming with Java: A Primer;
2. E. Balagurusamy Head First Java,
3. O-REILLY, Kathy Sierra & Bert Bates.
4. OCA Java SE Programmer I Certification Guide ,
5. Wiley Publisher ,
6. Mala GuptaPROGRAMMER'S GUIDE TO JAVA SE 8 , Pearson , Khalid E Mughal

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	02	15
2.	03	15
3.	03	30
4.	03	20
5.	03	20
Total	14	100

5.2 Practicum	SYSTEM ADMINISTRATION	L	T	P
		1	-	4

COURSE OBJECTIVES:

The objective of this course is to enable the students to understand the concepts of operating system such as windows and linux including their installation, configuration and management. It also makes the learners to protect the system from unauthorised access, malware and other cyber threats. Further the learners can able to understand the network administration which includes learning about networking principles, protocols and services.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Understand who the system administrator is, what is his role and responsibilities on it

CO2: Install, work, manage and troubleshoot on windows Operating System

CO3: Install, work, manage and troubleshoot on Linux Operating System

CO4: Write basic scripts for automation, debugging and troubleshooting scripts

CO5: Understand the basic concepts of networking and its security principles

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	-	1	2	3	3	*	*
CO2	3	3	2	3	1	1	3	*	*
CO3	3	3	2	3	1	1	3	*	*
CO4	3	3	3	3	-	1	3	*	*
CO5	3	2	1	2	1	1	3	*	*

COURSE CONTENT

UNIT 1: Introduction to system administration and windows OS

02 Periods

Overview of System administration: definition, role and importance- Responsibilities and Duties of a System administrator- Ethics and Professionalism in system administration

Introduction to operating system: Types and Features - Overview of windows OS: Evolution of windows OS, Different versions and editions

Installation and configuration: Hardware requirements, Installation Procedures, Initial setup and configuration

UNIT 2: Security and troubleshooting in windows system

03 Periods

Security Management: Antivirus software installation and configuration, Windows firewall settings - Performance monitoring and optimization: Task manager and Resource Monitor, Disk cleanup and defragmentation

Software installation and management: Installing and uninstalling applications, Managing updates and patches

Basic Troubleshooting: common issues and resolutions, Event Viewer and system logs - Backup and Recovery: Windows backup utility, System restore

UNIT 3: Introduction to Linux OS and its administration

03 Periods

Overview of Linux Operating System: History and distributions of Linux, Basic command-line interface (CLI) usage

File System Hierarchy: Understanding the Linux file system structure, File permissions and ownership, File and directory manipulation commands

User and Group Management: User account creation and management, Group administration, Sudo and sudoers configuration

Package Management: Package management using package managers (apt, yum), Software installation, updates, and removal

UNIT 4: Security and troubleshooting in Linux system

03 Periods

Networking and Services: Configuring network interfaces, Basic network troubleshooting, Managing services using system

Security and Permissions: Firewall configuration (iptables, firewalld), Secure Shell (SSH) configuration, File permissions and access control lists (ACLs)

System Monitoring and Performance: Monitoring system resources (CPU, memory, disk), Performance tuning and optimization, Log file management and analysis

Shell Scripting: Introduction to shell scripting, Writing basic scripts for automation, Debugging and troubleshooting scripts

UNIT 5: Network administration

03 Periods

Basic Network Administration: Introduction to Networking, Networking fundamentals, topologies, Common networking devices (routers, switches, etc.) - IP Addressing and

Subnetting: IPv4 and IPv6 addressing, Subnetting and subnet masks, Address resolution protocols (ARP)

Network Protocols and Services: DHCP and DNS fundamentals, TCP and UDP protocols, HTTP, FTP, SMTP protocols

Network Security Principles: Firewalls, Intrusion Detection Systems (IDS), VPNs.

Text and Reference Books:

1. Musumeci, Gian-Paolo D., and Mike Loukides. System Performance Tuning. 2nd ed. O'Reilly Media, Inc., 2002.
2. Russinovich, Mark E., and David A. Solomon. Windows Internals. 7th ed. Redmond, WA: Microsoft Press, 2017.
3. Kurose, James F., and Keith W. Ross. Computer Networking: A Top-Down Approach. 7th ed. Pearson, 2017.
4. Barrett, Daniel J. Linux Pocket Guide. 4th ed. O'Reilly Media, Inc., 2024.
5. Nemeth, Evi, Garth Snyder, Trent R. Hein, Ben Whaley, et al. UNIX and Linux System Administration Handbook. 5th ed. Addison-Wesley, 2017

LIST OF PRACTICALS

1. User and Group Management
 - Create, modify, and delete user accounts
 - Create and manage user groups
 - Set and manage user permissions and quotas
2. File System and Disk Management
 - Partition a hard disk using tools like fdisk, parted
 - Format and mount file systems (ext4, NTFS, etc.)
 - Check disk usage using df, du, and mount
3. Package Management

- Install, upgrade, and remove packages using:
 - Linux: apt, yum, or dnf
 - Windows: Chocolatey or manual installers
 - Configure package repositories
4. Backup and Restore
- Create scheduled backups using cron and rsync
 - Backup with compression using tar, gzip
 - Restore from a backup
5. Network Configuration
- Configure IP address (static and dynamic)
 - Test network connectivity using ping, traceroute, netstat, ip, ifconfig
 - Configure DNS, gateway, and hosts file
6. Remote Access
- Configure and use SSH for remote login
 - Use scp and rsync for secure file transfers
 - Windows: Use Remote Desktop (RDP)
7. Log Management and System Monitoring
- View system logs (/var/log/syslog, journalctl)
 - Set up log rotation
 - Monitor system performance (CPU, memory, disk)
8. Firewall and Security
- Configure firewall using ufw, iptables, or firewalld
 - Manage SELinux or AppArmor policies
 - User permission management using chmod, chown, umask
9. Virtualization Basics
- Install and configure a virtual machine using VirtualBox or VMware
 - Install guest OS and manage virtual network adapters
10. Printer and Peripheral Configuration
- Install and manage printers (CUPS in Linux)
 - Add/remove peripheral devices and drivers
11. System Updates and Patching
- Check and apply system updates
 - Automate update checks and apply patches securely

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	02	15
2.	03	15
3.	03	30
4.	03	20
5.	03	20
Total	14	100

5.3 PROGRAM ELECTIVE -2

5.3.1 Practicum	(a) DATA SCIENCE AND MACHINE LEARNING	L	T	P
		3	-	4

COURSE OBJECTIVE

This course will introduce the concept of Data Science and Machine Learning and implementation of Machine Learning Algorithms. So that students will be able to solve real time problems using data science and machine learning techniques.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO 1: Understand the basics of Data Science

CO 2: Visualize and Analyze Data

CO 3: Understand concept of Exploratory Data Analysis

CO 4: Understand and develop Machine Learning Algorithms.

CO 5: Implement Mining Process on Social Network Graph

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	2	1	2	1	1	2	*	*
CO2	3	3	2	3	1	3	2	*	*
CO3	3	3	2	3	1	2	2	*	*
CO4	3	3	3	3	2	1	3	*	*
CO5	3	3	3	3	2	1	3	*	*

COURSE CONTENT

UNIT 1: Introduction of data Science and Machine Learning: (10 Periods)

Fundamentals of Artificial Intelligence, need and applications of Data Science, Data Mining, data preparation, Machine Learning, Types and Applications of Machine learning

UNIT 2: Data Preprocessing, Analysis and Visualization: (6 Periods)

Data Pre-processing: Pre-processing Techniques- Mean Removal, Scaling, Normalization, Binarization, One Hot Encoding, Label encoding, Data Analyses: Loading and summarizing the dataset, Data Visualization: Univariate Plots, Multivariate Plots, Training Data, Test Data, Performance Measures

UNIT 3: Statistical Inference & Exploratory Data Analysis and the Data Science Process (10 Periods)

Populations and samples, Types of Statistical modelling, Types of probability distributions. Parametric and Non-Parametric Methods, Distance Metrics.

Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.

UNIT 4: Machine Learning Algorithms**(8 Periods)**

Introduction to Supervised Learning Algorithms –Decision Tree, Linear Regression, k Nearest Neighbours (k-NN), SVM and Introduction to Unsupervised Learning Algorithms - K-means Clustering, Mean Shift Algorithm, Dimensionality Reduction Techniques, Introduction to Neural Networks.

UNIT 5: Mining Social-Network Graphs, Data Science and Ethical Issues**(8 Periods)**

Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighbourhood properties in graphs, Discussions on privacy, security, ethics, A look back at Data Science, Next-generation data scientists.

Reference Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

SUGGESTED DISTRIBUTION OF MARKS

SR No	Topic Time Allotted (periods)	Marks Allotted
1	10	22
2	6	16
3	10	22
4	8	20
5	8	20
TOTAL	42	100

LIST OF PRACTICALS

- WAP to implement the Decision Tree Algorithm
- WAP to implement the Linear Regression
- WAP to implement the k-Nearest Neighbors (k-NN)
- WAP to implement the SVM Algorithm
- WAP to implement the K-means Clustering
- WAP to implement various Distance Metrics
- WAP to implement Dimensionality Reduction Techniques

OR
Program Elective -2

5.3.2 Practicum	(b) CLOUD COMPUTING	L	T	P
		3	-	4

COURSE OBJECTIVE

This course offers a good understanding of cloud computing concepts and challenges faced in implementation of cloud computing.

COURSE OUTCOMES

After undergoing the subject, the students would be able to:

CO 1: Understand the core concepts of cloud computing paradigm.

CO 2: Understand different Service and Deployment Models and describe SLA management

CO3 : Explain and apply the concept of virtualization

CO 4: illustrate concepts of cloud storage and various security issues

CO 5: Describe the scheduling of tasks in cloud.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	-	-	1	-	1	*	*
CO2	3	2	2	1	2	3	1	*	*
CO3	3	2	2	3	2	-	2	*	*
CO4	3	3	2	2	3	1	2	*	*
CO5	3	3	2	2	1	-	1	*	*

COURSE CONTENTS

UNIT 1. Introduction

(06 Periods)

Evolution of Cloud Computing, Cloud Computing Overview, Characteristics, Applications, Benefits, Challenges.

UNIT 2. Service and Deployment Models and Service Level Agreement (SLA) Management (12 Periods)

Cloud Computing Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service; Cloud Computing Deployment Models: Private Cloud; Public Cloud, Community Cloud, Hybrid Cloud, Major Cloud Service providers. Overview of SLA, Types of SLA, SLA Life Cycle, SLA Management Process.

UNIT 3. Virtualization Concepts

(08 Periods)

Overview of Virtualization, Types of Virtualization, Benefits of Virtualization, Hypervisors.

UNIT 4. Cloud Storage and Security

(08 Periods)

Overview; Storage as a Service, Benefits and Challenges, Storage Area Networks (SANs). Infrastructure Security, Data Security & Privacy Issues, Legal Issues in Cloud Computing.

UNIT 5. Scheduling in Cloud**(08 Periods)**

Overview of Scheduling problem, Different types of scheduling, Scheduling for independent and dependent tasks, Static vs. Dynamic scheduling.

RECOMMENDED BOOKS

Rajkumar Buyya, James Broberg, Andrzej Goscinski (Editors): Cloud Computing: Principles and Paradigms, Wiley, 2011

Kumar Saurabh, Cloud Computing, Wiley, 2012.

Barrie Sosinsky: Cloud Computing Bible, Wiley, 2011.

Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper: Cloud Computing for Dummies, Wiley, 2010

E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites for Reference: <http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

SR No	Topic Time Allotted (periods)	Marks Allotted
1	06	16
2	12	24
3	08	16
4	08	22
5	08	22
TOTAL	42	100

LIST OF PRACTICALS

1. Introduction to Cloud Vendors: Amazon, Microsoft, IBM.
2. Setting up Virtualization using Virtualbox/VMWare Hypervisor
3. Introduction to OwnCloud Installation and configuration of OwnCloud software for SaaS
4. Accessing Microsoft AZURE cloud-services
5. Cloud Simulation Software Introduction: CloudSim

5.4 PROGRAM ELECTIVE-3

5.4.1 Practicum	(a). SOFTWARE TESTING	L	T	P
		3	-	4

COURSE OBJECTIVES

The primary objectives of software testing are to identify defects, validate the software's compliance with requirements, and ensure the software meets desired quality standards before release.

COURSE OUTCOMES

CO 1: Understand the basics of Software Quality

CO 2: Implementation of Test Cases

CO 3: Execution of Test cases using various tools

CO 4: Implementation of automated test cases

CO 4: Understanding Quality Assurance

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	-	-	-	-	1	*	*
CO2	3	3	3	3	-	1	-	*	*
CO3	2	2	2	3	-	1	2	*	*
CO4	2	3	3	3	-	1	2	*	*
CO5	3	1	-	-	1	2	1	*	*

COURSE CONTENT

UNIT 1: Basics Introduction to Software Quality

(8 Periods)

Verification and validation, quality perspectives, Testing terminology, Software Testing Life Cycle (STLC), “V” model of Testing, QA process, cost of testing, types of tests,

UNIT 2: Writing Test Cases

(8 Periods)

Writing test cases, Functional Testing, non-functional testing, (Performance testing), UI testing. Preparing test data, Writing Unit test, Integration test and User Acceptance Tests, preparing test scenarios from Software requirements

UNIT 3: Test Execution and Management

(10 Periods)

Test execution, Test Oracles, test planning, test strategy including when to stop testing, test-coverage - Traceability matrix, JIRA, Bugzilla and other bug tracking tools. Test data mining, test reporting.

UNIT 4: Test Automation

(8 Periods)

Why automation, when not to automate, writing simple automated test cases, learn and practice any one automated testing framework like Selenium etc.

UNIT 5: Other quality Assurance

(8 Periods)

Quality and Defect management - Code reviews, Quality tools, Change management, version control

Reference Books/Resources:

1. Software Engineering – A Practitioner’s Approach, 7th Edition, Roger Pressman.
2. Bugzilla (<https://www.bugzilla.org/>)
3. JIRA (<https://www.atlassian.com/software/jira>)

LIST OF PRACTICALS

1. Design test cases for web pages testing of any website.
2. Study of any bug tracking tool (Bugzilla etc)
3. Study of any open source testing tool (Test link)
4. Design and run test cases for MS Word application using an Automation Tool.
5. Study of any web testing tool (Selenium)
6. Write program and design test case for loop control and decision control statements.
7. Study of various quality and defect management tools.
8. Prepare defect report after executing test cases for any login form.
9. Design test cases for e-commerce (Flipkart, Amazon) login form.
10. Design test cases for railway reservation form.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	08	14
2.	08	25
3.	10	25
4.	08	18
5.	08	18
Total	42	100

PROGRAM ELECTIVE-3

5.4.2	b) NETWORK FORENSICS	L	T	P
Theory		3	-	4

COURSE OBJECTIVE:

To understand various network forensic aspects for analysing network security breach

COURSE OUTCOMES:

After completion of this course student will be able to :

CO 1: Understand basic concepts of network forensics

CO 2: Learn Different Forensic Tools

CO 3: Apply Forensic techniques on different layers of network model

CO 4: perform various forensic investigations

CO 5: Understand different challenges of Network Forensics

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	-	1	-	-	1	*	*
CO2	2	1	-	3	-	-	3	*	*
CO3	3	3	2	3	-	-	2	*	*
CO4	2	3	2	3	2	2	2	*	*
CO5	1	2	1	-	3	1	3	*	*

COURSE CONTENT:**UNIT 1:**

(06 Periods)

Review of Networking concepts and Protocols, Introduction to Network Forensics, various aspects of Network Forensics

UNIT 2:

(10 Periods)

Introduction to Network Forensic Tools and techniques: Wireshark, TCP Dump, Syslog, NMS, Promiscuous Mode, Network Port Mirroring, snooping, scanning tools, etc.

UNIT 3:

(10 Periods)

Understanding and Examining Data Link Layer, Physical Layer, Ethernet Switch Logs, MAC Table, ARP Table, etc. Understanding and Examining Network Layer, Router Logs, WiFi Device logs, Firewall logs,

UNIT 4:

(08 Periods)

Understanding audit features of OS and applications; Enabling and Examining Server logs, User activity logs,

Browser history analysis, Proxy server logs, Antivirus logs, Email logs

UNIT 5:

(08 Periods)

Limitations and challenges of network forensics due to encryption, spoofing, mobility, storage limitations, privacy laws, etc.

REFERENCE BOOKS:

1. Manuals of OS, application software, network devices
2. RFCs of various networking protocols (<https://www.ietf.org/>)
3. <https://www.sans.org/>
4. <https://www.cert-in.org.in/>
5. Handbook of Digital Forensics and Investigation, Eoghan Casey, Elsevier Academic Press
6. Cyber Forensics, Albert Marcella and Doug Menendez, CRC Press
7. Computer Forensics (5 volume Set) mapping to CHFI (Certified Hacking Forensics Investigator), by EC- Council

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	06	15
2.	10	25
3.	10	20
4.	08	20
5.	08	20
Total	42	100

LIST OF PRACTICALS

1. Study network forensics and various tools available.
2. How to recover deleted files using forensics tool.
3. Study the steps for hiding and extract any text file behind an image file/ Audio file using Command Prompt.
4. How to make the forensic image of the hard drive.
5. How to Restoring the Evidence Image.
6. How to Collect Email Evidence.
7. How to View Last Activity.
8. Comparison of two Files for forensics investigation.
9. Live Forensics Case Investigation.

Open Elective -2

5.5.1	(a). PRODUCT DESIGN	L	T	P
Theory		2	-	-

COURSE OBJECTIVE

The objective of product design is to create a product with excellent functional utility and sales appeal at an acceptable cost within a reasonable time.

COURSE OUTCOMES

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

CO1: Understand the characteristics and concepts used for product design

CO2: Assess the customer requirements in product design.

CO3: Apply structural approach for product design.

CO4: Develop optimized methods to minimize the cost.

CO5: Design simple products

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainabil y and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	1	-	1	-	1	*	*
CO2	2	3	2	1	3	2	1	*	*
CO3	3	2	3	3	1	1	1	*	*
CO4	2	3	3	3	3	2	1	*	*
CO5	2	3	3	3	2	2	2	*	*

COURSE CONTENT

UNIT 1: DEFINITION OF A PRODUCT

(6 Periods)

Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of interconnected decision areas; Brain storming.

UNIT 2: PRODUCT LIFE CYCLE;

(8 Periods)

The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry-product strategies.

UNIT 3: PRODUCT DESIGN;**(10 Periods)**

Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

UNIT 4: INTRODUCTION TO OPTIMIZATION IN DESIGN;**(12 Periods)**

Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design.

UNIT 5: DESIGN OF SIMPLE PRODUCTS:**(6 Periods)**

Dealing with various aspects of product development; Design starting from need till the manufacture of the product.

REFERENCE BOOKS:

1. Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design –George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford: New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, “Product Design and Manufacturing”, Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	06	15
2.	08	20
3.	10	22
4.	12	25
5.	06	18
Total	42	100

OR
Open Elective -2

5.5.2	ENGINEERING ECONOMICS & ACCOUNTANCY	L	T	P
Theory		2	-	-

COURSE OBJECTIVE

Students will analyze the performance and functioning of government, markets and institutions in the context of social and economic problems. Students will think critically about economic models, evaluating their assumptions and implications.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO 1: Understand the concept of Managerial Economics

CO 2: Understand and Analyze Demand and Supply

CO 3: Analyze and Estimate Production Cost

CO 4: Apply Pricing methods in practice

CO 5: Understand concepts of Accounting

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	-	-	3	1	1	*	*
CO2	3	3	1	-	3	1	1	*	*
CO3	3	3	1	1	2	3	1	*	*
CO4	3	2	2	1	2	2	1	*	*
CO5	3	1	-	2	1	3	3	*	*

UNIT 1 : INTRODUCTION:

(8 Periods)

Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.

UNIT 2: DEMAND & SUPPLY ANALYSIS:

(8 Periods)

Demand; Types of demand; Determinants of demand; Demand function; Demand elasticity; Demand forecasting; Supply; Determinants of supply; Supply function; Supply elasticity.

UNIT 3: PRODUCTION AND COST ANALYSIS:

(10 Periods)

Production function; Returns to scale; Production optimization; Least cost input; Isoquants; Managerial uses of production function; Cost Concepts; Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

UNIT 4: PRICING:

(8 Periods)

Determinants of Price; Pricing under different objectives and different market structures; Price discrimination; Pricing methods in practice; Role of Government in pricing control

UNIT 5: ELEMENTARY ACCOUNTING:**(8 Periods)**

Introduction to Accountancy, Cash flow analysis; Payback Period; Net Present Value;

REFERENCE BOOKS:

1. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House, New Delhi, 2018
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics' Thomson South Western, 10th Edition, 2005.
3. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.
4. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
5. Paresah Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.
6. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson South Western, 4th Edition, 2001.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	08	20
2.	08	20
3.	10	20
4.	08	20
5.	08	20
Total	42	100

5.6 SUMMER INTERNSHIP -II (6 WEEKS AFTER 4TH SEM.)

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is Summer Internship, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised Summer Internship of 4 weeks duration to be organized during the semester break starting after second year i.e. after 4th semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that an internship schedule may be drawn for each student before starting of the internship in consultation with the internship providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization. Equally important with the guidance is supervision of students internship in the industry/organization by the teachers. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on. An external assessment of **50 marks** has been provided in the study and evaluation scheme of 3rd Semester. Evaluation of professional Summer Internship report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. Teachers and students are requested to see the footnote below the study and evaluation scheme of 5th semester for further details.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

- a) Punctuality and regularity 15%
- b) Initiative in learning new things 15%
- c) Presentation and VIVA 15%
- d) Industrial training report 55%

5.1	INDIAN CONSTITUTION	L	T	P
Theory		2	-	-

COURSE OBJECTIVES

This Course on Constitutional Law is designed to give to the students a basic knowledge and understanding about Fundamental Rights and Directive Principles of State Policy which constitute a very important part of our Constitution that is committed to individual liberty and freedom.

Unit 1 – The Constitution – Introduction (06 Periods)

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation

Unit 2 – Union Government (06 Periods)

- Structure of the Indian Union Government
- President – Election, Role and Power
- Prime Minister and Council of Ministers

Unit 3- Indian Legislature & Judiciary (06 Periods)

- Composition of Lok Sabha and Rajya Sabha
- Powers & Functions of Lok Sabha and Rajya Sabha
- Structure of Supreme Court including Appointment of Judges
- Powers & Functions of Supreme Court

Unit 4 – State Government (03 Periods)

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 5 – Local Administration (04 Periods)

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 6 – Election Commission (03 Periods)

- Structure of Election Commission of India
- Role and Function of Election Commission

Suggested Distribution of Books

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition
4. Our Constitution Subhash Chand Kashyap NBT New Delhi.

Suggested Software/Learning Websites:

- a. <https://www.constitution.org/cons/india/const.html>
- b. <http://www.legislative.gov.in/constitution-of-india>
- c. <https://www.sci.gov.in/constitution>
- d. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>
- e. <https://ncert.nic.in/textbook.php>

SUGGESTED DISTRIBUTION OF MARKS

SR No	Topic Time Allotted (periods)	Marks Allotted
1	6	20
2	6	20
3	6	20
4	3	12
5	4	16
6	3	12
TOTAL	28	100

SIXTH SEMESTER

6.1	ENTREPRENEURSHIP AND START-UPS	L	T	P
Theory		2	-	-

COURSE OBJECTIVES

Explore the Objectives of Entrepreneurship, including innovation, wealth creation, and societal impact, and learn how Entrepreneurs foster economic growth. Entrepreneurship drives the economy and is the very fundamental to all innovation and development.

COURSE OUTCOMES

CO 1: Understand the basic of Entrepreneurship and Business Structures

CO 2: Planning and implementation of Business ideas

CO 3: Understanding Strategical Market Analysis

CO 4: Manage Organizational roles

CO 5: Understanding various Financial schemes

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	1	-	-	-	2	*	*
CO2	2	3	3	2	1	3	2	*	*
CO3	2	2	2	2	1	-	2	*	*
CO4	2	1	2	-	2	3	2	*	*
CO5	3	2	2	2	2	1	2	*	*

COURSE CONTENT

Unit 1 - Introduction to Entrepreneurship and Start – Ups (02 Periods)

- Definitions, Classification of Entrepreneur
- Traits of an Entrepreneur, Intrapreneurship, Motivation
- Types of Business Structures- On the Basis of size and On the basis of ownership
- Similarities/differences between entrepreneurs and managers

Unit 2 – Business Ideas and their implementation (06 Periods)

- Discovering ideas and visualizing the business
- Activity map
- Business Plan (Case Study)

Unit 3 – Ideas to Start-up (06 Periods)

- Marketing and Accounting- Definition and Importance.
- Market Analysis – STP (Segmentation, Targeting, Positioning)
- Competition evaluation and Strategy Development – Vision, Mission, Goal, Objectives.
- Risk analysis- SWOT Analysis.

Unit 4 – Management (04 Periods)

- Definition Concept and Functions of Management
- Company's Organization Structure- Concept and Classification
- Recruitment and Selection- Definition,
- Training and Development- Importance.

Unit 5 - Financing and Protection of Ideas

(06 Periods)

- Financing methods available for Entrepreneurship/ Startups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing).
- Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses
- Communication of Ideas to potential investors – Investor Pitch.

Unit 6: Succession, Dissolution and Harvesting strategy

(04 Periods)

- Ways of succession
- Types of Dissolution

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN – 978-0984999392
2.	Entrepreneurship Development (A new Venture creation)	Vasant Desai	Himalya Publication
3.	Entrepreneurship Development	Khanka S.S.	S Chand & Company Limited New Delhi
4.	Entrepreneurship Development	Gupta and Srinivsan	S Chand & Company Limited New Delhi
5	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN – 978-0755388974
6	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN – 978-0670921607
7	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Christensen	Harvard business ISBN: 978-142219602

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- <https://www.fundable.com/learn/resources/guides/startup>
- <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/>
- <https://www.finder.com/small-business-finance-tips>
- <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>
- NPTel Course on Entrepreneurship https://onlinecourses.nptel.ac.in/noc23_mg74/preview

- f. National Geographic Channel you tube Video on “GI Tag Crafts of Bharat”

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	2	17
2	6	14
3	6	20
4	4	17
5	6	21
6	4	11
Total	28	100

6.2 PROGRAM ELECTIVE-4

6.2.1	INFORMATION SECURITY AND IT LAWS	L	T	P
Theory		4	-	-

COURSE OBJECTIVES

Contents of this course provide understanding of Information Security & their measures. Content of this course will enable students to use techniques like Cryptography, VPNs, IDS etc. and IT Laws in the field of Information Technology.

COURSE OUTCOMES

After undergoing this course, the students will be able to:

CO 1: Understand the need for security, Security principles and various computer related attacks.

CO 2: To get aware with Organizational Security

CO 3: Apply different types of cryptography techniques to encrypt/decrypt data or information.

CO 4: Understand concept of IDS and Network Security

CO 5: Understand the Intellectual property laws and IT Laws with latest amendments applicable in India

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	2	1	2	1	-	3	*	*
CO2	2	1	-	-	2	3	2	*	*
CO3	3	3	3	3	-	-	2	*	*
CO4	3	2	1	2	-	1	2	*	*
CO5	2	-	-	-	3	1	3	*	*

COURSE CONTENTS

UNIT 1: INTRODUCTION AND SECURITY TRENDS :

(8 Periods)

Need for security, Security principles.

Threats to security : Viruses and Worms, Intruders, Insiders, Criminal organization, Terrorist, Information Warfare (IW), Avenues of attack.

Types of attack : Active and Passive attacks, Denial of service, backdoors and trapdoors, sniffing, spoofing, man in the middle, replay, TCP/IP Hacking, Encryption attacks, Malware : Viruses, Logic bombs.

UNIT 2: ORGANIZATIONAL/ OPERATIONAL SECURITY :

(6 Periods)

Role of people in security : Password selection, Piggybacking, Shoulder surfing, Dumpster diving, Installing unauthorized software/hardware, Access by non-employees, Security awareness, Individual users responsibilities.

Physical security : Access controls Biometrics, Network security basics, Network Security Model.

UNIT 3. CRYPTOGRAPHY AND PUBLIC KEY INFRASTRUCTURE :

(12 Periods)

Introduction: Cryptology, Cryptography, Cryptanalysis, Substitution techniques; Caesar's cipher, monoalphabetic and polyalphabetic transposition techniques- Rail fence technique, simple columnar, steganography.

Hashing - Concept

Symmetric and asymmetric cryptography : Introduction Symmetric encryption: DES (Data Encryption Standard) algorithm, Diffie-Hellman algorithm, Problem of key distribution, Asymmetric key cryptography :RSA
Public key encryption : Basics, Digital Signature and digital certificates.

UNIT 4: NETWORK AND SYSTEM SECURITY

(08 Periods)

Firewalls : Concept, design, principles, limitations, trusted system, Kerberos- concept. Tunnelling, IP security : Overview, architecture, IPSec, IPSec configuration, IPSec security.Virtual Private Network. Email security standards : Working principles of SMTP, PEM, PGP, S/MIME. Intruders, Intrusion detection system (IDS), Host Based IDS, Network based IDS.

UNIT 5: IT LAWS

(08 Periods)

Information Security Standards - ISO, IT Act, Copyright Act, Patent Law, IPR, Cyber Laws in India. IT Act 2000,Provisions and latest amendments. Intellectual property law : Copy Right Law, Software License, Semiconductor Law and Patent Law.

RECOMMENDED BOOKS

Information Security Handbook by Darren Death ,Packt Publishing

Principles of Information Security by Whitman , Cengage Publisher

Cyber Security by Nina Godbole, Wiley Publisher

Introduction to Information Security And Cyber Laws by Dr. Surya Prakash Tripathi

Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley Publisher

Cryptography and Network Security - Principles and Practice by Stallings William, Pearson Education Publisher.

Cyber Law & Cyber Crimes Simplified ,by Cyber Infomedia Publisher

Information Technology Act, 2000 Along with Rules & Regulations by Universal Law Publishing

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	08	15
2.	06	15
3.	12	30
4.	08	20
5.	08	20
Total	42	100

OR

PROGRAM ELECTIVE-4

6.2.2	FOSS (FREE AND OPEN SOURCE SOFTWARE)	L	T	P
Theory		4	-	-

COURSE OBJECTIVE

The Free and Open Source Software (FOSS) course is designed to familiarise students with the development process using free and open source software, which includes Linux operating system, service configuration management, application software, and development tools.

COURSE OUTCOMES

CO 1: Understand the concept of Free and Open Source Softwares and Community

CO 2: Understanding and Working on LINUX OS

CO 3: Apply various FOSS Tools

CO 4: Implementation of FOSS Case studies

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	2	1	1	2	1	3	*	*
CO2	3	2	2	3	2	1	2	*	*
CO3	3	2	3	3	3	1	2	*	*
CO4	3	2	3	3	2	3	2	*	*

COURSE CONTENT

UNIT 1: Introduction:

(12 Periods)

FOSS PHILOSOPHY Understanding the FOSS Community and FOSS Philosophy, Benefits of Community based Software Development, Guidelines for working with FOSS community, Requirements for being open, free software, open source software, FOSS Licensing Models, FOSS examples

UNIT 2: Basics of LINUX:

(10 Periods)

Linux Installation and Hardware Configuration, Boot Process, Dual-Boot Linux and other Operating Systems, Kernel Options during Boot, X Windows System Configuration, System Administration (Server Administration, Backup and Restore Procedures, Strategies for keeping a Secure Server)

UNIT 3: Programming Tools and Techniques:

(12 Periods)

Libreoffice Tools; Samba: Cross platform; Introduction about LAMP; Brief Introduction to Programming using languages like Java /Python / Perl; Database Systems Mysql, PostgreSQL or equivalent; Open Source UML Tools; Introduction to Mobile Programming; Version Control Systems like SVN, Git or equivalent; Project Management Tools; Bug Tracking Systems; Package Management Systems

UNIT 4: FOSS CASE STUDIES:

(8 Periods)

Some example case studies of FOSS implementation

Reference Books:

1. Linux in a Nutshell, by Ellen Siever
2. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.
3. Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-madeeasy/>.
4. Version control system URL: <http://git-scm.com/>.
5. Samba: URL : <http://www.samba.org/>.
6. Libre office: <http://www.libreoffice.org/>.

SUGGESTED DISTRIBUTION OF MARKS

SR No	Topic Time Allotted (periods)	Marks Allotted
1	12	27
2	10	26
3	12	27
4	08	20
TOTAL	42	100

6.3 IN HOUSE PROJECT

In House Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The students should identify themselves or accept the given project assignment at least two to three months in advance. The project work identified in collaboration with industry should be preferred. Each teacher is expected to guide the project work of 5–6 students. The project assignments may consist of:

- Programming customer based applications
- Web page designing (Only dynamic)
- Database applications
- Software Development

LEARNING OUTCOMES

After undergoing this subject, the student will be able to:

- Use effectively oral, written and visual communication
- Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
- Identify, analyze and solve problems creatively through sustainment critical investigation.
- Develop, leadership abilities.
- Apply fundamental and disciplinary concepts and methods in ways appropriate to their areas of study.

OR

6.4 OPEN ELECTIVE-3

6.4.1	DISASTER MANAGEMENT	L	T	P
Theory		2	-	-

COURSE OBJECTIVES

Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery.

COURSE OUTCOMES

CO 1: Understanding disaster and hazards

CO 2: Understanding types, consequences and control of disasters

CO 3: Understanding Disaster Management Cycle

CO 4: Understanding Disaster Management Acts in India

CO 5: Understanding application of technology for Managing the disasters

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	2	1	-	3	1	2	*	*
CO2	3	3	2	1	3	2	2	*	*
CO3	3	2	2	1	3	3	2	*	*
CO4	2	1	-	-	3	2	2	*	*
CO5	2	2	2	3	2	2	3	*	*

COURSE CONTENT

Unit – I: Understanding Disaster

(4 Periods)

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters

(6 Periods)

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire);

Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit- III: Disaster Management Cycle and Framework

(6 Periods)

Disaster Management Cycle – Paradigm Shift in Disaster Management.

Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.

During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation –

Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery –

Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India

(6 Periods)

Disaster Profile of India – Mega Disasters of India and Lessons Learnt.

Disaster Management Act 2005 – Institutional and Financial Mechanism,

National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies

Unit- V: Applications of Science and Technology for Disaster Management

(6 Periods)

Geo-informatics in Disaster Management (RS, GIS, GPS and RS).

Disaster Communication System (Early Warning and Its Dissemination).

Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non-Structural Mitigation of Disasters

S&T Institutions for Disaster Management in India

References

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

SUGGESTED DISTRIBUTION OF MARKS

SR No	Topic Time Allotted (periods)	Marks Allotted
1	4	17
2	6	22
3	6	22
4	6	22
5	6	17
TOTAL	28	100

OR OPEN ELECTIVE -3

6.4.2	RENEWABLE ENERGY TECHNOLOGIES	L	T	P
Theory		2	-	-

COURSE OBJECTIVE

The main purpose of this course is to introduce students with renewable energy resources availability, potential and suitability as a substitute for conventional energy resources in future energy demand.

COURSE OUTCOMES

CO 1: Understanding basics of Renewable Energy

CO 2: Understanding Solar Energy

CO 3: Understanding Wind Energy

CO 4: Understanding Bio Energy

CO 5: Understanding Tidal, Wave, Hydro Thermal Energy

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainabilit y and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	1	1	-	3	1	2	*	*
CO2	3	2	2	1	3	1	2	*	*
CO3	3	2	2	1	3	1	2	*	*
CO4	3	1	1	-	3	1	2	*	*
CO5	3	1	1	-	3	1	2	*	*

UNIT-I: Introduction:

(4 Periods)

World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilization; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit-II: Solar energy:

(6 Periods)

Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit-III: Wind Energy:

(6 Periods)

Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-IV: Bio-Energy:

(6 Periods)

Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit-V: Other Renewable Energy Sources:

(6 Periods)

Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford **University Press**, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.

7. Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	4	20
2.	6	20
3.	6	20
4.	6	20
5.	6	20
Total	28	100

8- GUIDELINES FOR ASSESSMENT OF STUDENT-CENTRED ACTIVITIES (SCA)

It was discussed and decided that the maximum marks for SCA should be 50 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows-

- 1- 15 Marks for general behaviour and discipline
(by HODs in consultation with all the teachers of the department)
- 2- 10 Marks for attendance as per following:
(by HODs in consultation with all the teachers of the department)
 - a) 75 - 80% 06 Marks
 - b) 80 - 85% 08 Marks
 - c) Above 85% 10 Marks
- 3- * **Even Semester:**
25 Marks maximum for Sports/NCC/Cultural/Co-curricular/NSSactivities as per following: (by In-charge Sports/NCC/Cultural/Co-curricular/NSS)
 - a) State/National Level participation

- b) Participation in two of above activities
- c) Inter-Polytechnic level participation

****Odd Semester:**

25 Marks maximum

- a) Language Lab Practices / foreign language practices
- b) Group Discussion and Personality Development
- c) Industrial Visits/Industrial Talks
- d) Power Point Presentations and Resume Making
- e) Development of Aptitude and Reasoning Skills
- f) Participation in the technical Exhibitions, Symposiums, Seminars, Workshops at the Institute /District/State/National Level.

9- RESOURCE REQUIREMENT

A : Laboratory

1. Computer Center

S.No.	Description	QTY	Total Price
A	B	C	D
1.	Computer Desktop (i7,8th Generation, 1TB Hard disk/500 GB SSD, 8Gb RAM, Pre loaded window with 5 year warranty)	60	48,00,000/-
2.	Computer Table and Chair	60	9,00,000/-
3.	Working Bench with power Supply + 40 Stools	04	100000/-
4.	Component Storage Rack	05	100000/-
5.	Online UPS, 6KVA	2	2,00,000/-
6.	Printer	1	25000/-
7.	Switch with 24 port speed 10/100/1000 (Manageable)	03	1,50,000/-
8.	Smart Board interactive panel	01	4,00,000/-
9.	Network Forensic FOSS like The Sleuth Kit, Autopsy, NetworkMiner, Wireshark, Volatility, Jhon the Ripper, Disk Drill, Cryptool, OpenPuff, MailTracker	LS	-

	etc.		
10.	Android Studio or other FOSS like Xamarin	LS	-
11.	Multimedia authoring Tool or Similar FOSS	LS	1,00,000/-
12.	MS Office latest or equivalent FOSS Libre Office/Open Office (Freeware	LS	20,000/-
13.	FOSS CASE tools like Jmeter, Selenium etc	LS	-
14.	Compiler Turbo C, C++ or equivalent FOSS like VS Code	LS	10,000/-
15.	Web camera, Mike and speakers	01	20,000/-
16.	Air Conditioner 2 ton	02	1,40,000/-
17.	Antivirus Software	05 user	10,000/-
18.	Internet connectivity	60 Nodes	3,00,000/-

2. Programming lab

S.No.	Description	QTY	Total Price
A	B	C	D
1.	Computer Desktop (i7,8th Generation, 1TB Hard disk/500 GB SSD, 8Gb RAM, Pre loaded window with 5 year warranty)	60	48,00,000/-
2.	Computer Table and Chair	60	9,00,000/-
3.	Working Bench with power Supply + 40 Stools	04	100000/-
4.	Component Storage Rack	05	100000/-
5.	Online UPS, 6KVA	2	2,00,000/-
6.	Switch with 24 port speed 10/100/1000 (Manageable)	03	1,50,000/-
7.	Printer	1	25000/-
8.	scanner	01	65,000/-
9.	Laptop	01	70,000/-
10.	Digital camera	01	30,000/-
11.	Handy Cam	01	25,000/-
12.	Smart Board interactive panel	01	4,00,000/-
13.	Network Forensic FOSS like The Sleuth Kit, Autopsy, NetworkMiner, Wireshark, Volatility, Jhon the Ripper, Disk Drill, Cryptool, OpenPuff, MailTracker etc.	LS	-
14.	Android Studio or other FOSS like Xamarin	LS	-
15.	MS Office latest or equivalent FOSS Libre Office/Open Office (Freeware	LS	20,000/-
16.	FOSS CASE tools like Jmeter, Selenium etc	LS	-
17.	Compiler Turbo C, C++ or equivalent FOSS like VS Code	LS	10,000/-
18.	Web camera, Mike and speakers	01	20,000/-
19.	Air Conditioner 2 ton	02	1,40,000/-
20.	Antivirus Software	05 user	10,000/-
21.	Internet connectivity	60 Nodes	3,00,000/-

3. Networking lab/ IoT Lab/Project Lab

S.No.	Description	QTY	Total Price
A	B	C	D
1.	Computer Server (Quad core, intel processor 32 GB RAM)	1	5,00,000/-
2.	Computer Desktop (i7,8th Generation, 1TB Hard disk / 500 GB SSD, 8Gb RAM, Pre loaded window with 5 year warranty)	20	16,00,000/-
3.	Computer Table and Chair	20	3,00,000/-
4.	Working Bench with power Supply + 40 Stools	04	100000/-
5.	Component Storage Rack	05	100000/-
6.	Online UPS, 6KVA	1	1,00,000/-
7.	Smart Board interactive panel	01	4,00,000/-
8.	Printer	1	25000/-
9.	Switch with 24 port speed 10/100/1000 (Manageable)	1	50,000/-
10.	Connectors (RJ-45, RJ-11, BNC, SC, ST)	LS	10,000/-
11.	Cables: (UTP,STP,OFC) - 25 m each	LS	10,000/-
12.	Router	1	40,000/-
13.	Modem cum Router	2	10,000/-
14.	Networking Printer	1	1,00,000/-
15.	Internet Connectivity	20 Nodes	1,00,000/-
16.	LAN Trainer	4	60,000/-
17.	Antivirus Software	LS	10,000/-
18.	Unmanaged Switch	4	60,000/-
19.	Hub	2	20,000/-
20.	Air Conditioner 2 ton	2	1,40,000/-
21.	Miscellaneous- cables and connectors, computer stationery, printer consumables (inks), toner etc.	LS	30,000/-
22.	Arduino Uno IDE with built in Wifi	20	20,000/-
23.	Raspberry pi	2	6000/-
24.	Sensor Kits (e.g. MQ135, DHT11 etc.)	20	100000/-
25.	Bluetooth module HC05	20	5000/-
26.	Display Screen	20	5000/-
27.	Relay Module	20	5000/-
28.	Miscellaneous- cables and connectors, computer stationery, printer consumables (inks), toner etc.	LS	30000/-

B - Furniture Requirement

Norms and standards laid down by AICTE -APH (latest) be followed for working out furniture requirement for diploma courses

C- Human Resources:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE.

List of Participants/Experts

The following experts have participated/ contributed in workshop for Developing Curriculum Scheme / Competency Profile according to AICTE and NEP-2020, of Three Year Diploma course in **Information Technology** at IRDT Kanpur.

- 1- Shri Neeraj Kumar, HOD, IT, MMIT Hathras .
- 2- Shri Rajesh, HOD, IT, Government Girls Polytechnic Baliya .
- 3- Shri Uday Pratap, Lecturer IT, Government Girls Polytechnic Gorakhpur .
- 4- Smt. Divya Singh, Lecturer IT, Government Girls Polytechnic Ayodhya .
- 5- Shri Puneet Rai, Lecturer IT, MMIT Hathras .
- 6- Smt. Kavita Choudhary, Lecturer IT, Government Polytechnic Jhansi.
- 7- Shri Nikhil Singh, Lecturer IT, Government Girls Polytechnic Ayodhya .

EVALUATION SCHEME:

For Theory Courses:

(The weightage of Internal assessment is 40% and for End Semester Exam is 60%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

A.a. For Practical Courses:

(The weightage of Internal assessment is 60% and for End Semester Exam is 40%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

A.b. For Summer Internship / Projects / Seminar etc.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

12 -Evaluation Method

ANNEXURE- 1

1. EVALUATION METHOD for THEORY

	Internal Assessment (40 marks)				External Assessment (60 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Written Test	Written Test	Attendance and Assignments	Pre – Semester Examination	End Semester Examination
Portion	2 units	2 units	Regularly	All units	All units
Duration1hr	1hr	1hr	-	3hrs	3hrs
Exam Marks	20	20	20	60	60
Converted to	10	10	15	15	60
Tentative Schedule	5 th Week	10 th Week	Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 20 marks should be conducted for two units. The marks earned (20 marks) will be converted to 10 marks. The best of the two assessments will be evaluated for an internal 10-mark assessment.

IA3: Assignments given after the completion of each unit, along with attendance throughout the semester, will be assessed for a total of 15 marks.

IA4: The pre-semester examination should follow the end-semester examination question pattern. The marks should be adjusted to 15 for internal assessment.

2. EVALUATION METHOD for PRACTICAL

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Practical Test and Quiz – Viva Voce	Practical Examination
Portion	50% Practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	3 hrs	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

IA1 and IA2: Complete all exercises and experiments as outlined and retain them for the practical test. The test should be conducted in accordance with the evaluation scheme. The best of the two practical tests will be internally evaluated for a total of 20 marks.

IA3: Maintain a practical file for each exercise while ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, and practical test along with a valid certificate (Progress Card). This will be assessed for 20 marks.

IA4: The pre-semester practical examination, quiz, and viva-voce should follow the end-semester practical examination pattern, with marks adjusted to 20 for internal assessment.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Diagram	5
C.	Procedure	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Practical Test	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Diagram	5
C.	Procedure	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

3. EVALUATION METHOD for PRACTICUM (End Exam-Practical)

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Micro Project	Practical Examination
Portion	50% practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	Regularly	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

- **IA1 and IA2:** Complete all exercises and experiments as instructed and retain them for the practical test. The test should be conducted according to the evaluation scheme. The best of the two practical tests will be internally assessed for a total of 20 marks.
- **IA3:** Maintain a practical file for each exercise, ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be evaluated by 20 marks.
- **IA4:** Submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be assessed by both the laboratory supervisor and an internal examiner. This evaluation will contribute 20 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Diagram	5
C.	Procedure	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Mini Project	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Diagram	5
C.	Procedure	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

4. EVALUATION METHOD for PRACTICUM (End Exam-Theory)

	Internal Assessment (40 marks)						External Assessment (60marks)
	IA 1		IA 2		IA 3	IA 4	
Mode	Written Test	Practical Test	Written Test	Practical Test	Attendance and Practical Documentation	Pre Semester Examination and Micro Project	End Semester Examination
Portion	2 units	Practical related to the units	2 units	Practical related to the units	All unit	All Practical	All unit
Duration	1hr	3hrs	1hr	3 hrs	3hrs	Regularly	3hrs
Exam Marks	10	20	10	20	60	60	60
	30		30				
Converted to	10		10		15	15	60
Tentative Schedule	5 th Week		10 th Week		Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 10 marks should be conducted for two **UNITs**. Complete all exercises and experiments as outlined and retain them for the practical test worth 20 marks. The practical test should be conducted in accordance with the evaluation scheme. The total marks earned (30 marks) will be converted to 10 marks. The best of the two assessments will be internally evaluated for a total of 10 marks.

IA3: Attendance and the pre-semester examination should follow the end-semester examination question paper pattern. The marks should be adjusted to 15 for internal assessment.

IA4: Maintain a practical file for each exercise. Submit the required documents for the practical file, quiz/viva-voice, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be assessed for 40 marks. Additionally, submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be evaluated by both the laboratory supervisor and an internal examiner. The total of 60 marks will be converted to 15 marks.

PROCEDURES / FORMATS FOR ORGANIZING INTERNSHIPS.

STUDENT INTERNSHIP PROGRAM APPLICATION

Complete and submit to the TPO/ Internship Program Coordinator.

1. Student Name:		Enroll. No.:	
2. Campus Address:		Phone:	
3. Home Address:		Phone:	
4. Student email address:			
5. Branch:		6. Internship Semester: _____	
7. Internship Preferences			
	Company/Industry	Core Area	Location
Preference-1			
Preference-2			
Preference-3			
Faculty mentor Signature: _____ Date_____.			
Student Signature: _____ Date_____.			
Signature confirms that the student agrees to the terms, conditions, and requirements of the Internship Program			

Signature with seal
HOD/Principal

(ANNEXURE-I)

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP/INDUSTRIAL TRAINING PROVIDER

Ref. No.: _____

Date: _____

To,
The HR Manager/Training Coordinator
.....
.....

Subject: Request for Internship/Industrial Training for Diploma Students

Sir/Madam,

We are pleased to introduce....., a premier institution affiliated with Board of Technical Education, Uttar Pradesh, offering diploma programs in various diploma disciplines.

As a part of the curriculum, our students are required to undergo Internship/Industrial Training to gain practical exposure and enhance their technical competencies. Therefore, we kindly request your esteemed organization to provide Internship/Training opportunities to our students during the period from to

S. No.	Name	Enroll. No.	Semester/Year	Discipline

Yours sincerely,

(Head of Department/Principal)

PROFORMA FOR EVALUATION OF INTERNSHIP BY INDUSTRY

Student Name:Evaluation Date:

Industry Supervisor Name:

Company/Organization:

Title of the Project:

Please evaluate your intern by indicating the frequency with which you observed the following behaviors:

Parameters	Max. Marks	Marks Given
Attendance and Punctuality	20	
Discipline and Professional Behavior	20	
Technical Knowledge and Understanding of Processes	30	
Practical Skills and Quality of Work	20	
Ability to Apply Theoretical Knowledge	20	
Problem Solving and Analytical Ability	10	
Communication and Interpersonal Skills	20	
Teamwork and Collaboration	10	
Internship Report/Documentation	20	
Presentation and Viva-Voce	30	
Total Marks	200	

Additional comments, if any:

Signature with seal of Industry supervisor

HR Manager

INTERNSHIP REPORT

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and got ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

- i. Originality.
- ii. Adequacy and purposeful write-up.
- iii. Organization, format, drawings, sketches, style, language etc.
- iv. Variety and relevance of learning experience.
- v. Practical applications, relationships with basic theory and concepts taught in the course.

MONITORING & EVALUATION OF INTERNSHIP

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation by faculty supervisor of Industry.
3. Evaluation through seminar presentation/viva-voce at the Institute.

1. EVALUATION BY INDUSTRY

The industry will evaluate the students based on the Punctuality, eagerness to learn, Maintenance of Daily Diary and skill test in addition to any remarks.

2. MONITORING/ SURPRISE VISIT BY TPO/ STAFF/ FACULTY MENTOR

TPO/Staff/ Faculty Mentor of the institutes will make a surprise visit to the internship site, to check the student's presence physically, if the student is found absent without prior intimation to the T & P Cell, entire training will be cancelled. Students should inform the TPO, faculty mentor as well as the industry supervisor at least one day prior to availing leave by email. Students are eligible to avail 1-day leave in 4 weeks and 2 days leave in 6 weeks of the internship period apart from holidays and weekly offs.

3. EVALUATION THROUGH SEMINAR PRESENTATION/VIVA-VOCE AT THE INSTITUTE

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in students.