COMPETENCY BASED CURRICULUM

DIPLOMA
IN
COMPUTER ENGINEERING

(Duration 03 Years)
NSQF Level – 5

Under
Haryana State Board of Technical Education

Developed By

Curriculum Development Center

National Institute of Technical Teachers Training & Research

(Ministry of Education, Government of India)

Sector - 26, Chandigarh, UT, India

TABLE OF CONTENTS

Sr. No.	Description	Page No.
1	Preface	i – i
2	Acknowledgement	ii – ii
3	Salient Features	iii – iii
4	NSQF Compliance	iv – vii
5	NEP 2020	viii– ix
6	Diploma Programme Outcomes	x– x
7	Diploma Programme Study and Evaluation Scheme	xi – xvii
8	Diploma Programme Horizontal and Vertical Organization of Subjects	xviii– xviii
9	Deriving Curriculum Subject Areas from Diploma Programme Outcomes	xix – xx
FIRST YEAR NSQF LEVEL – 3		
10	Competency Profile and Employment Opportunities	1 - 1
11	Programme Outcomes	2 - 2
12	Study and Evaluation Scheme	3 - 4
13	Horizontal and Vertical Organization of Subjects	5 - 5
14	Assessment of Programme and Course Outcomes	6 - 10
15	Subjects & Detailed Contents	11 -57
SECOND YEAR NSQF LEVEL – 4		
16	Competency Profile and Employment Opportunities	
17	Programme Outcomes	
18	Study and Evaluation Scheme	
19	Horizontal and Vertical Organization of Subjects	
20	Assessment of Programme and Course Outcomes	
21	Subjects & Detailed Contents	
THIRD YEAR NSQF LEVEL – 5		
22	Competency Profile and Employment Opportunities	
23	Programme Outcomes	
24	Study and Evaluation Scheme	

25	Horizontal and Vertical Organization of Subjects	
26	Assessment of Programme and Course Outcomes Subject Contents	
27	Subjects & Detailed Contents	
EFFECTIVE IMPLEMENTATION & EVALUATION TOOLS		
28	Assessment Tools & Criterion	xxi - xxv
29	Teaching Learning Tools for Effective Implementation	xxvi - xxix
30	List of Experts and Reviewers	xxx - xxxiii

1. PREFACE

Learning and learning experience are the foundation of any education system. Appropriateness of education and its useful implications stand on the platform of knowledge and skill. But the knowledge and skill cannot be quantified qualitatively without ensuring learning experience. Curriculum is the pathway to select and organise learning experience. It helps the teachers to provide tangible resources, goals and objectives to learners. Curriculum acts as a catalyst to stimulate creativity, innovation, ethics, values, responsibility and many human factors. Curriculum embodies rigour and high standards and creates coherence to empower learner to meet the industrial and societal needs. Curriculum is a central guide for a teacher to plan a standard based sequence for the instructional delivery.

The industrial revolution 4.0 has forced the technical education system to reinvent the curriculum to meet the human resource requirement of the industry. The data driven systems relying on the subjects like machine-learning, Artificial Intelligence, Data Science etc are literally forcing the technical education system to offer different subjects differently to address the emerging challenges. The non-linear way of learning now facilitates students to choose path of knowledge to skill or vice-versa. The bi-directional process requires innovative curriculum design and revision. Diploma programme is now more challenging than ever. The level of skill and knowledge demanded by industry from diploma holders are highly interdisciplinary at the same time address special need. Hence, there is a need to align the curriculum to National Skill Qualification Framework (NSQF).

National Education Policy, NEP-2020 has now opened up diversities for the education system to explore and exploit to make the education relevant. The policy emphasises to inculcate value, ethics, respect to culture and society etc along with industry ready knowledge and skill among the students. The interdisciplinary nature of curriculum, academic bank of credits and integration of technology in teaching-learning envisaged in NEP-2020 make it more challenging for curriculum development. NITTTR, Chandigarh has developed the art of curriculum development over 54 years of its existence. The expertise and experience available in the institute follow time-tested and acclaimed scientific methods to design/revise curriculum. The experienced faculty members entrusted with the curriculum development or revision activities are well-versed with NSQF, NEP and Outcome based education. I am happy to note that **Haryana State Board of Technical Education, Panchkula, Haryana** reposed their confidence on this expertise to develop **AICTE/NSQF/NEP 2020** aligned curriculum for the state. This documented curriculum is an outcome of meticulous planning and discussions among renowned experts of the subject through series of workshops. The effective implementation of this curriculum supported with quality instructional resources will go a long way in infusing the learning experience among learners to make them industry ready.

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Director
National Institute of Technical Teachers Training & Research, Chandigarh

2. ACKNOWLEDGEMENT

We gratefully acknowledge the assistance and guidance received from the following persons:

i) Principal Secretary Technical Education-cum-Chairman, Haryana State Board of Technical Education, Panchkula, Haryana for initiating this project on designing of AICTE/NSQF/NEP 2020 aligned curriculum.

ii) Director General, Technical Education, Haryana for taking keen interest in the design of this AICTE/NSQF/NEP 2020 aligned curriculum.

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v) Director, National Institute of Technical Teachers' Training and Research, Chandigarh for his support and academic freedom provided to Curriculum Development Centre.

vi) All the participants from Industry / field Organizations, Academic Institutions, State Technical Universities / Polytechnics for their professional & academic inputs during curriculum workshops.

vii) Head, Faculty and staff of Curriculum Development Centre, NITTTR, Chandigarh for their dedicated contribution and support in design of NSQF aligned curriculum.

viii) Faculty from different departments of NITTTR, Chandigarh for their valuable inputs in design of NSQF aligned curriculum.

Prof. (Dr.) Rajesh Mehra
Project Coordinator & Head Curriculum Development Center
National Institute of Technical Teachers Training & Research, Chandigarh

3. SALIENT FEATURES

1.	Name	:	**Diploma in Computer Engineering**
2.	Duration	:	**03 Years**
3.	Hours per week	:	**35 - 40**
4.	Entry Qualification	:	**10th Pass**
5.	Student Intake	:	**As per sanctioned strength**
6.	Pattern	:	**Semester**
7.	Scheme	:	**Multi Point Entry and Exit**
8.	NSQF Level	:	**5**
9.	Theory Practical Ratio	:	**30 : 70**
10.	Project Work	:	**Minor and Major Project**
11.	In-house/Industrial Training	:	**Mandatory after First and Second Year**

4. NSQF COMPLIANCE

National Skill Qualification Framework has defined total Ten Levels. Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

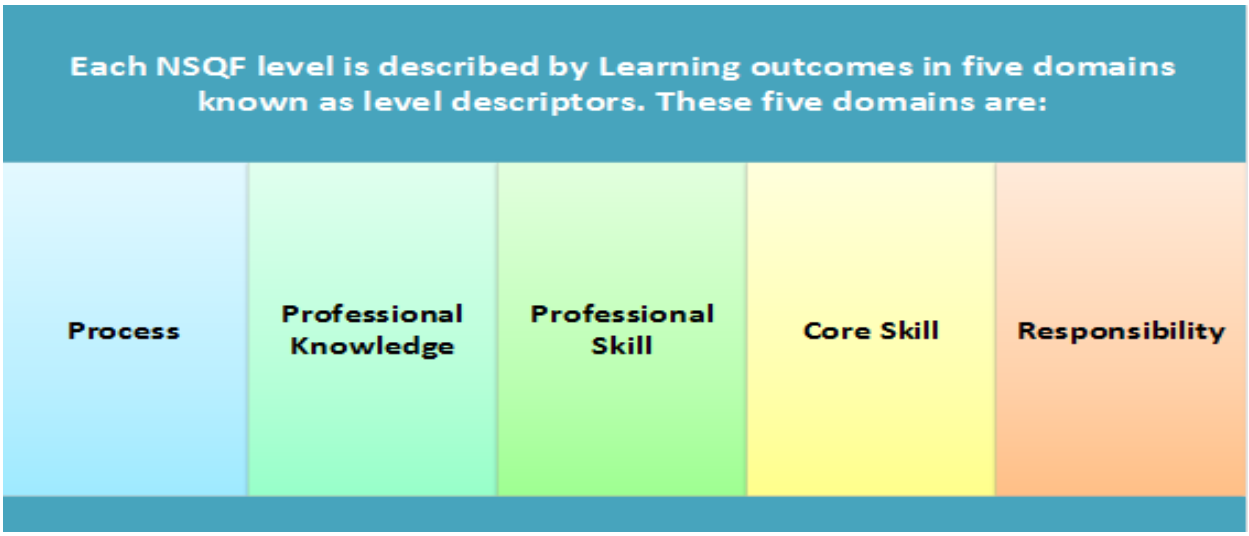

Fig1: NSQF Domains

NSQF LEVEL - 3 COMPLIANCE

The NSQF level - 3 descriptor is as follows:

Process	• Person may carry out a job which may require limited range of activities routine and predictable.
Professional Knowledge	• Basic facts, process and principle applied in trade of employment.
Professional Skill	• Recall and demonstrate practical skill, routine and repetitive in narrow range of application.
Core Skill	• Communication written and oral, with minimum required clarity, skill of basic arithmetic and algebraic principles, personal banking, basic understanding of social and natural environment.
Responsibility	• Under close supervision. Some responsibility for own work within defined limit.

Fig 2: NSQF Level – 3 Descriptor

Work requiring knowledge, skills and aptitudes at level 3 will be routine and predictable. Job holders will be responsible for carrying out a limited range of jobs under close supervision. Their work may require the completion of a number of related tasks. People carrying out these job roles may be described as "Semi skilled workers". Individuals in jobs which require level 3 qualifications will normally be expected to be able to communicate clearly in speech and writing and may be required to use arithmetic and algebraic processes. They will be expected to have previous knowledge and skills in the occupation and should know the basic facts, processes and principles applied in the trade for which they are qualified and be able to apply the basic skills of the trade to a limited range of straightforward jobs in the occupation.

They will be expected to understand what constitutes quality in their job role and more widely in the sector or sub-sector and to distinguish between good and bad quality in the context of the jobs they are given. Job holders at this level will be expected to carry out the jobs they are given safely and securely. They will work hygienically and in ways which show an understanding of environmental issues. This means that they will be expected to take responsibility for their own health and safety and that of fellow workers and, where appropriate, customers and/or clients. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social environment. They should be able to make a good contribution to team work.

NSQF LEVEL - 4 COMPLIANCE

The NSQF level-4 descriptor is given below:

Process	• Work in familiar, predictable, routine, situation of clear choice
Professional Knowledge	• Factual knowledge of field of knowledge or study.
Professional Skill	• Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts.
Core Skill	• Communication written and oral, with required clarity, skill of basic arithmetic and algebraic principles, personal banking, basic understanding of social and natural environment.
Responsibility	• Responsibility for own work and learning.

Fig 3: NSQF Level – 4 Descriptor

Work requiring knowledge, skills and aptitudes at level 4 will be carried out in familiar, predictable and routine situations. Job holders will be responsible for carrying out a range of jobs, some of which will require them to make choices about the approaches they adopt. They will be expected to learn and improve their practice on the job. People carrying out these jobs may be described as "skilled workers". Individuals in jobs which require level 4 qualifications should be able to communicate clearly in speech and writing and may be required to use arithmetic and algebraic processes. They will be expected to have previous knowledge and skills in the occupation in which they are employed, to appreciate the nature of the occupation and to understand and apply the rules which govern good practice. They will be able to make choices about the best way to carry out routine jobs where the choices are clear.

They will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their job roles. Job holders at this level will be expected to carry out their work safely and securely and take full account of the health and safety on colleagues and customers. They will work hygienically and in ways which show an understanding of environmental issues. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social and political environment. They should be able to guide or lead teams on work within their capability.

NSQF LEVEL - 5 COMPLIANCE

The NSQF level-5 description is given below:

Process	• Job that requires well developed skill, with clear choice of procedures in familiar context.
Professional Knowledge	• Knowledge of facts, principles, processes and general concepts, in a field of work or study.
Professional Skill	• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information.
Core Skill	• Desired mathematical skill; understanding of social, political; and some skill of collecting and organising information, communication.
Responsibility	• Responsibility for own work and learning and some responsibility for others' works and learning

Fig 4: NSQF Level – 5 Descriptor

Work requiring knowledge, skills and aptitudes at level 5 will also be carried out in familiar situations, but also ones where problems may arise. Job holders will be able to make choices about the best procedures to adopt to address problems where the choices are clear. Individuals in jobs which require level 5 qualifications will normally be responsible for the completion of their own work and expected to learn and improve their performance on the job. They will require well developed practical and cognitive skills to complete their work. They may also have some responsibility for others' work and learning. People carrying out these jobs may be described as "fully skilled workers" or "supervisors".

Individuals employed to carry out these jobs will be expected to be able to communicate clearly in speech and writing and may be required to apply mathematical processes. They should also be able to collect and organise information to communicate about the work. They will solve problems by selecting and applying methods, tools, materials and information. They will be expected to have previous knowledge and skills in the occupation, and to know and apply facts, principles, processes and general concepts in the occupation. They will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their work. They will be expected to operate hygienically and in ways which show an understanding of environmental issues. They will take account of health and safety issues as they affect the work they carry out or supervise.

In working with others, they will be expected to conduct themselves in ways which show an understanding of the social and political environment.

5. NATIONAL EDUCATION POLICY (NEP) - 2020

NEP 2020 aims at a comprehensive holistic education to develop all capacities of human beings - intellectual, aesthetic, social, physical, emotional, and moral - in an integrated manner. A holistic arts education will help develop well-rounded individuals that possess: critical 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences, and professional, technical, and vocational fields; an ethic of social engagement; soft skills, such as communication, discussion and debate; and rigorous specialization in a chosen field or fields. Such a holistic education shall be, in the long term, the approach of all undergraduate programmes, including those in professional, technical, and vocational disciplines.

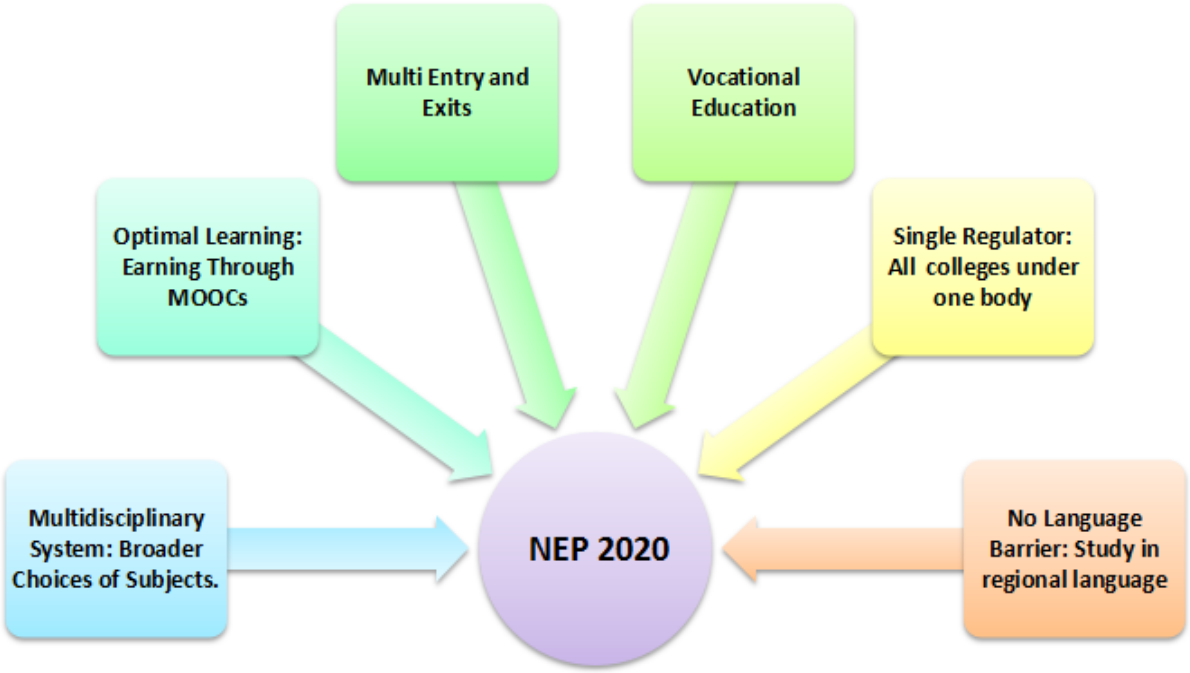

Fig 5: NEP 2020

Flexibility in curriculum and novel and engaging course options will be on offer to students, in addition to rigorous specialization in a subject or subjects. Pedagogy for courses will strive for significantly less rote learning and an increased emphasis on communication, discussion, debate, research, and opportunities for cross-disciplinary and interdisciplinary thinking. The flexible and innovative curriculum shall emphasize on offering credit-based courses and projects in the areas of community engagement and service, environmental education and value-based education. as part of a holistic education, students will be provided with opportunities for internships with local industry, businesses, artists, crafts persons, villages and local communities, etc., as well as

research internships with faculty and researchers at their own or other HEIs or research institutions, so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

Effective learning requires relevant curriculum, engaging pedagogy, continuous formative assessment and adequate student support. The curriculum must be updated regularly aligning with the latest knowledge requirements and shall meet specified learning outcomes. High-quality pedagogy is then necessary to successfully impart the curricular material to students; pedagogical practices determine the learning experiences that are provided to students - thus directly influencing learning outcomes. The assessment methods have to be scientific and test the application of knowledge. Higher Education Institutes should move to a criterion-based grading system that assesses student achievement based on the learning goals for each programme, making the system fairer and outcomes more comparable. HEIs should also move away from high-stakes examinations towards more continuous and comprehensive evaluation.

6. DIPLOMA PROGRAMME OUTCOMES

The program outcomes are derived from five domains of NSQF Level namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this programme, the student will be able to:

PO1: Perform tasks in limited range of activities, familiar situation with clear choice of procedures.

PO2: Acquire knowledge of principles and processes in the field of Computer Engineering.

PO3: Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**

PO4: Demonstrate skill of communication, basic mathematics, collecting and organizing information along with knowledge of social, political and natural environment.

PO5: Take the responsibility of own works and supervises others work.

PO6: Select multidisciplinary and open subjects of own interest and perform self learning through Massive Open Online Courses.

7. DIPLOMA PROGRAMME STUDY AND EVALUATION SCHEME
FIRST YEAR

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
1.1	*English and Communication Skills - I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.2	*Applied Mathematics - I	4	-	4 + 0 = 4	40	-	40	60	-	60	100
1.3	*Applied Physics - I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.4	*Fundamentals of IT	2	4	2 + 2 = 4	40	40	80	60	60	120	200
1.5	Computer Workshop	-	6	0 + 3= 3	-	40	40	-	60	60	100
1.6	**Electronics Workshop	-	6	0 + 3=3	-	40	40	-	60	60	100
# Student Centered Activities(SCA)		-	5	-	-	-	-	-	-	-	-
Total		**10**	**25**	**20**	**160**	**200**	**360**	**240**	**300**	**540**	**900**

* Common with other Diploma Courses.

** Common with Medical Electronics.

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

SECOND SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
2.1	Advances in IT	3	2	3 + 1 = 4	40	40	80	60	60	120	200
2.2	*Applied Mathematics-II	4	-	4 + 0 = 4	40	-	40	60	-	60	100
2.3	*Applied Physics - II	2	2	2 + 1 = 3	40	40	80	60	60	120	200
2.4	Analog Electronics	2	4	2 + 2 = 4	40	40	80	60	60	120	200
2.5	*Engineering Graphics	-	6	0 + 3 = 3	-	40	40	60	-	60	100
2.6	Multimedia Applications	2	4	2 + 3 = 4	40	40	80	60	60	120	200
2.7	*Environmental Studies & Disaster Management	2	-	2 + 0 = 2	40	-	40	60	-	60	100
# Student Centered Activities (SCA)		-	2	-	-	-	-	-	-	-	-
Total		**15**	**20**	**24**	**240**	**200**	**440**	**420**	**240**	**660**	**1100**

* Common with other Diploma Courses

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

Summer Industrial/In-house Training: After 2nd semester, students shall undergo Summer Training of minimum 4 Weeks.

THIRD SEMESTER

FOURTH SEMESTER

FIFTH SEMESTER

SIXTH SEMESTER

LIST OF ELECTIVES

8. DIPLOMA PROGRAMME HORIZONTAL AND VERTICAL ORGANISATION OF SUBJECTS

Sr. No.	Subjects/Areas	Hours Per Week	
		First Semester	Second Semester
1.	English and Communication Skills - I	4	-
2.	Applied Mathematics - I	4	-
3.	Applied Physics - I	4	-
4.	Fundamentals of IT	6	-
5.	Computer Workshop	6	-
6.	Electronics Workshop	6	-
7.	Advances in IT	-	5
8.	Applied Mathematics-II	-	4
9.	Applied Physics - II	-	4
10.	Analog Electronics	-	6
11.	Engineering Graphics	-	6
12.	Multimedia Applications	-	6
13.	Environmental Studies & Disaster Management	-	2
14.	Student Centered Activities	5	2
	Total	**35**	**35**

9. DERIVING CURRICULUM SUBJECT AREAS FROM DIPLOMA PROGRAMME OUTCOMES

The following curriculum areas have been derived from Diploma Programme Outcomes:

Sr. No.	Programme Outcomes	Curriculum Subjects / Areas
1.	Perform tasks in limited range of activities, familiar situation with clear choice of procedures.	• Applied Physics - I • Computer Workshop. • Electronics Workshop. • Advances in IT • Analog Electronics • Applied Physics - II • Engineering Graphics • Multimedia Applications
2.	Acquire knowledge of principles and processes in Electronics and Communication Engineering related field.	• Applied Physics - I • Advances in IT • Analog Electronics • Applied Physics - II • Multimedia Applications
3.	Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**	• Computer Workshop. • Electronics Workshop. • Advances in IT • Analog Electronics • Multimedia Applications Summer • Industrial /In - House Training.
4.	Demonstrate skill of communication, basic mathematics, collecting and organizing information along with knowledge of social, political and natural environment.	• English and Communication Skills - I • Applied Mathematics - I • Fundamentals of IT • Applied Mathematics - II • Environmental Studies & Disaster Management

5.	Take the responsibility of own works and supervises others work.	• Computer Workshop-I • Advances in IT • Multimedia Applications • Summer Industrial/In-House Training
6.	Select multidisciplinary and open subjects of own interest and perform self learning through Massive Open Online Courses.	• Multidisciplinary Elective • Open Elective

FIRST YEAR

NSQF LEVEL - 3

10. COMPETENCY PROFILE AND EMPLOYMENT OPPORTUNITIES

In government and private sectors related to **Computer Engineering**, **"Semi Skilled workers"** are required to carry out a limited range of predictable tasks under close supervision. They are normally expected to communicate clearly in speech and along with knowledge of arithmetic and algebraic processes. They should know the basic facts, processes and principles applied in limited area of Electronics and Communication Engineering.

Computer Engineering NSQF Level – 3 pass out students are expected to recall and demonstrate practical routine and repetitive skills, in narrow range of related applications. They should have the basic knowledge of Concrete use of physical principles and analysis in various technical fields. They should have good exposure of various aspects of information technology such as understanding the concepts of information technology and its scope, operating a computer: use of various office management tools, using internet and mobile applications etc. They should be able to operate basic software related to computer and should have good exposure of types of computers, computer components and interfaces, input and output devices installation and assembly.

Computer Engineering students are expected to write scripts that control a sequence of program steps such as those used in developing testing and deploying software. They should be able to handle modern scripting languages like Java Script. They are expected to realize circuits with components such as diodes, BJTs and transistors along with understanding of various types of amplifier circuits. They should be able to identify the proper applications of multimedia, evaluate the appropriate multimedia systems and develop effective multimedia applications.

They will have scope wage employment in organizations like Radar and Wireless, Railways, Defence Services, Para-military Forces**,** Civil Aviation**,** Defence Organizations**,** Electricity Boards and Corporations etc. They have scope in industries related to Computer Assembly, Computer Peripheral, Computer Software, Internet Server Providers**,** D.T.H component and Fabrication**,** EPBX, Telephone Exchange etc**.**

They will also have scope in establishing small start ups in the area of Marketing and Sales, Repair and Maintenance**,** Preparing Simulated Models**,** website development and multimedia application development etc.

11. PROGRAMME OUTCOMES

The program outcomes are derived from five domains of NSQF Level – 3 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Carry out a task which may require limited range of predictable activities.

PO2: Acquire knowledge of Basic facts, process and principles related to Computer Engineering for employment.

PO3: Demonstrate practical skill in narrow range of Computer Engineering applications.

PO4: Communicate in written and oral, with minimum required clarity along with skill of basic arithmetic and algebraic principles, personal banking and basic understanding of social and natural environment.

PO5: Perform task under close supervision with some responsibility for own work within defined limit.

FIRST YEAR
12. STUDY AND EVALUATION SCHEME

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
1.1	*English and Communication Skills - I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.2	*Applied Mathematics - I	4	-	4 + 0 = 4	40	-	40	60	-	60	100
1.3	*Applied Physics - I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.4	*Fundamentals of IT	2	4	2 + 2 = 4	40	40	80	60	60	120	200
1.5	Computer Workshop	-	6	0 + 3= 3	-	40	40	-	60	60	100
1.6	**Electronics Workshop	-	6	0 + 3=3	-	40	40	-	60	60	100
# Student Centered Activities(SCA)		-	5	-	-	-	-	-	-	-	-
Total		**10**	**25**	**20**	**160**	**200**	**360**	**240**	**300**	**540**	**900**

* Common with other Diploma Courses.

** Common with Medical Electronics.

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

SECOND SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
2.1	Advances in IT	3	2	3 + 1 = 4	40	40	80	60	60	120	200
2.2	*Applied Mathematics-II	4	-	4 + 0 = 4	40	-	40	60	-	60	100
2.3	*Applied Physics - II	2	2	2 + 1 = 3	40	40	80	60	60	120	200
2.4	Analog Electronics	2	4	2 + 2 = 4	40	40	80	60	60	120	200
2.5	*Engineering Graphics	-	6	0 + 3 = 3	-	40	40	-	60	60	100
2.6	Multimedia Applications	2	4	2 + 3 = 4	40	40	80	60	60	120	200
2.7	*Environmental Studies & Disaster Management	2	-	2 + 0 = 2	40	-	40	60	-	60	100
# Student Centered Activities (SCA)		-	2	-	-	-	-	-	-	-	-
Total		**15**	**20**	**24**	**240**	**200**	**440**	**360**	**300**	**660**	**1100**

* Common with other Diploma Courses

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

Summer Industrial/In-house Training: After 2nd semester, students shall undergo Summer Training of minimum 4 Weeks.

13. HORIZONTAL AND VERTICAL ORGANISATION OF SUBJECTS

Sr. No.	Subjects/Areas	Hours Per Week	
		First Semester	Second Semester
1.	English and Communication Skills - I	4	-
2.	Applied Mathematics - I	4	-
3.	Applied Physics - I	4	-
4.	Fundamentals of IT	6	-
5.	Computer Workshop	6	-
6.	Electronics Workshop	6	-
7.	Advances in IT	-	5
8.	Applied Mathematics-II	-	4
9.	Applied Physics - II	-	4
10.	Analog Electronics	-	6
11.	Engineering Graphics	-	6
12.	Multimedia Applications	-	6
13.	Environmental Studies & Disaster Management	-	2
14.	Student Centered Activities	5	2
	Total	**35**	**35**

14. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Carry out a task which may require limited range of predictable activities.	• Identify physical quantities, select their units and make measurements with accuracy. • Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications. • Draw Orthographic views of different objects viewed from different angles.. • Draw and interpret sectional views of an object which are otherwise not visible in normal view. • Draw Isometric views of different solids and develop their surfaces. • Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances /fittings. • Draw orthographic views of different objects by using basic commands of AutoCAD. • Identify and Handle various hardware components • Design and Develop Websites using HTML • Develop interactive Internet applications • Create interactive applications in Java script. • Design Internet Applications using Java Script • Differentiate between types of waves and their motion. • Illustrate laws of reflection and refraction of light. • Demonstrate competency in phenomena of electrostatics and electricity • Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier. • Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications. • Develop a well-designed, interactive Web site with respect to current standards and practices

	• Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language • Design time-based and interactive multimedia components. • Identify electronics components like resistors, capacitors, diodes, transistors etc. • Implement soldering and de-soldering on electronic circuit interconnections. • Identify different active electronic components and assemble circuits on breadboard. • Use measuring instruments like Multimeter, Function generator, Power Supply & DSO. • Able to test various electronic circuitry and batteries.
PO2: Acquire knowledge of Basic facts, process and principles related to Computer Engineering for employment.	• Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy. • Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications. • Describe the need of HTML and its applications in Web Development • Demonstrate competency in phenomena of electrostatics and electricity. • Characterize properties of material to prepare new materials for various technical applications. • Identify and able to understand physics behind various types of materials. • Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances. • Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations. • Determine the appropriate use of interactive verses standalone Web applications • Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its

	associated scripting language • Identify issues and obstacles encountered by Web authors in deploying Web-based application.
PO3: Demonstrate practical skill in narrow range of Computer Engineering applications.	• Elaborate scientific work, energy and power, forms of friction and solve problems related to them. • Comprehend properties of matter and effect of temperature on various matter and phenomenon. • Demonstrate the use of physical principles and analysis in various fields of engineering. • Install different types of software and use them appropriately • Assemble computer components • Interface various devices to PC/Laptop • Troubleshoot and Maintain PC/Laptop • Design and Develop Websites using HTML • Develop interactive Internet applications • Create interactive applications in Java script. • Design Internet Applications using Java Script • Characterize properties of material to prepare new materials for various technical applications. • Demonstrate a strong foundation on Modern Physics to use at various technical applications. • Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier. • Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications. • Develop a well-designed, interactive Web site with respect to current standards and practices • Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language • Design time-based and interactive multimedia components.
PO4: Demonstrate skill of communication, basic mathematics, collecting and organizing information along with knowledge of social, political and natural environment.	• Identify the nuances of Communication, both Oral and Written. • Acquire knowledge of the meaning of communication, communication process and

	speaking skills. • Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication. • Communicate effectively with an increased confidence to read, write and speak in English language fluently. • Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry. • Formulate engineering problems into mathematical formats with the use matrices, coordinate geometry and trigonometry • Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem. • Explore the idea of location, graph, and linear relationships between two variables. • Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers. • Handle the Computer / Laptop / Mobiles / Internet Utilities and Install/Configure OS. • Assemble a PC and connect it to external devices. • Manage and Use Office practiced Automation Tools. • Develop worksheets and Prepare presentations. • Formulate the engineering problems into mathematical format with the use of differential equations and differential • Use the differentiation and Integration in solving various Mathematical and Engineering problems. • Calculate the approximate area under a curve by applying integration and numerical methods. • Understand the purposes of measures of central tendency and calculate the measures of central tendency (mode, median, mean) for a set of data. • Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/

	SciLab software. • Comprehend the importance of sustainable ecosystem • Demonstrate interdisciplinary nature of environmental issues • Implement corrective measures for the abatement of pollution. • Identify the role of non-conventional energy resources in environmental protection. • Manage various types of disasters
PO5: Perform task under close supervision with some responsibility for own work within defined limit.	• Identify and Handle various hardware components • Install different types of software and use them appropriately • Assemble computer components • Interface various devices to PC/Laptop • Troubleshoot and Maintain PC/Laptop • Design and Develop Websites using HTML • Develop interactive Internet applications • Create interactive applications in Java script. • Design Internet Applications using Java Script • Develop a well-designed, interactive Web site with respect to current standards and practices • Design time-based and interactive multimedia components • Identify electronics components like resistors, capacitors, diodes, transistors etc. • Implement soldering and de-soldering on electronic circuit interconnections. • Identify different active electronic components and assemble circuits on breadboard. • Use measuring instruments like Multimeter, Function generator, Power Supply & DSO. • Able to test various electronic circuitry and batteries.

15. SUBJECTS & DETAILED CONTENTS

FIRST SEMESTER

FIRST SEMESTER

1.1	*English and Communication Skills - I	11 - 14
1.2	*Applied Mathematics - I	15 - 18
1.3	*Applied Physics - I	19 - 22
1.4	*Fundamentals of IT	23 - 26
1.5	Computer Workshop	27 - 29
1.6	**Electronics Workshop	30- 32

1.1 ENGLISH & COMMUNICATION SKILLS – I

L	P
2	2

RATIONALE

Language as the most commonly used medium of self-expression remains indispensable in all spheres of human life –personal, social and professional. This course is intended to break fresh ground in teaching of Communicative English as per the requirements of National Skill Quality Framework. This course is designed to help students to acquire the concept of communication and develop ability or skills to use them effectively to communicate with the individuals and community.

COURSE OUTCOMES

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

CO1: Identify the nuances of Communication, both Oral and Written.

CO2: Acquire knowledge of the meaning of communication, communication process and speaking skills.

CO3: Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication.

CO4: Communicate effectively with an increased confidence to read, write and speak in English language fluently.

DETAILED CONTENTS

UNIT I

Reading

1.1 Techniques of reading: Skimming and Scanning

1.2 Extensive and Intensive Reading: Textual Study

1.3 Homecoming – R.N. Tagore

1.4 Life Sketch of Sir Mokshagundam Visvesvarayya

1.5 Life Sketch of Dr. Abdul Kalam

1.6 Narayan Murthy's speech at LBSNA, Dehradun

UNIT II

Fundamentals of Communication

2.1 Concept and Process of Communication,

2.2 Types of Communication (Verbal Communication)

2.3 Barriers to Communication

2.4 Speaking Skill: Significance and essentials of Spoken Communication

2.5 Listening Skill: Significance and essentials of Listening

UNIT III

Grammar and Usage

3.1 Nouns

3.2 Pronouns

3.3 Articles

3.4 Verbs(Main and Auxiliary)

3.5 Tenses

UNIT IV

Writing Skills

4.1 Significance, essentials and effectiveness of Written Communication

4.2 Notice Writing

4.3 Official Letters and E-mails.

4.4 Frequently-used Abbreviations used in Letter-Writing

4.5 Paragraph Writing

4.6 Netiquettes

PRACTICAL EXERCISES

1 Reading

Reading Practice of lessons in the Lab Activity classes.

i. Comprehension exercises of unseen passages along with the lessons prescribed.

ii. Vocabulary enrichment and grammar exercises based on the selected readings.

iii. Reading aloud Newspaper headlines and important articles.

2 Fundamentals of Communication

i. Introducing oneself, others and leave- taking(talking about yourself)

ii. Just a minute (JAM) sessions: Speaking extempore for one minute on given topics

iii. Situational Conversation: Offering-Responding to offers; Congratulating; Apologising and Forgiving; Complaining; Talking about likes and dislikes, Self-introduction Mock Interviews.

3 Grammar and Usage

i. Written and Oral Drills will be undertaken in the class to facilitate holistic linguistic competency among learners.

ii. Exercises on the prescribed grammar topics.

4 Writing Skills

i. Students should be given Written Practice in groups so as to inculcate team-spirit and collaborative learning .

ii. Group exercises on writing paragraphs on given topics.

iii. Opening an e-mail account, receiving and sending emails

RECOMMENDED BOOKS

1. Alvinder Dhillon and Parmod Kumar Singla, "Text Book of English and Communication Skills Vol – 2", M/S Abhishek Publications, Chandigarh.
2. V Sasikumar & PV Dhamija, "Spoken English", Tata MC Graw Hills, New Delhi, Second Edition.
3. JK Gangal, "A Practical Course in Spoken English", PHI Learning Pvt. Ltd., New Delhi.
4. NK Aggarwal and FT Wood, "English Grammar, Composition and Usage", Macmillan Publishers India Ltd., New Delhi.
5. RC Sharma and Krishna Mohan, "Business Correspondence & Report writing", Tata MC Graw Hills, New Delhi, Fourth Edition.
6. Kavita Tyagi & Padma Misra, "Professional Communication", PHI Learning Pvt. Ltd., New Delhi.
7. Nira Konar, "Communication Skills for professionals", PHI Learning Pvt. Ltd., New Delhi.
8. Krishna Mohan & Meera Banerji, "Developing Communication Skills", Macmillan Publishers India Ltd., New Delhi, Second Edition
9. M. Ashraf Rizwi, "Effective Technical Communication", Tata MC Graw Hills, New Delhi.
10. Andrea J Rutherfoord, "Basic Communication Skills for Technology", Pearson Education, New Delhi.

INSTRUCTIONAL STRATEGY

This is practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required communication skills in the students. This subject contains four units of equal weight age.

1.2 APPLIED MATHEMATICS – I

L	P
4	-

RATIONALE

Contents of this course provide fundamental base for understanding engineering problems and their solution algorithms. Contents of this course will enable students to use basic tools like logarithm, binomial theorem, matrices, t-ratios and co-ordinates for solving complex engineering problems with exact solutions in a way which involve less computational task. By understanding the logarithm, they will be able to make long calculations in short time and it is also a pre-requisite for understanding Calculus.

COURSE OUTCOMES

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

CO1: Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry.

CO2: Formulate engineering problems into mathematical formats with the use matrices, co-ordinate geometry and trigonometry

CO3: Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.

CO4: Explore the idea of location, graph, and linear relationships between two variables.

CO5: Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software.

DETAILED CONTENTS

UNIT I

Algebra

1.1 Complex Numbers: definition of complex number, real and imaginary parts of a complex number, Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude, addition subtraction, multiplication and division of complex numb

1.2 Logarithms and its basic properties

UNIT II

Binomial Theorem, Determinants and Matrices

2.1 Meaning of ${}^{n}p_{r}$ & ${}^{n}c_{r}$ (mathematical expression). Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion up to 3 terms - without proof), first binomial approximation with application to engineering problems.

2.2 Determinants and Matrices – Evaluation of determinants (upto 2^{nd}order), solution of equations (upto 2 unknowns) by Crammer's rule, definition of Matrices and its types, addition, subtraction and multiplication of matrices (upto 2^{nd} order).

UNIT III

Trigonometry

3.1 Concept of angle, measurement of angle in degrees, grades, radians and their conversions.

3.2 T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa

3.3 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

UNIT IV

Co-ordinate Geometry

4.1 Cartesian and Polar co-ordinates (two dimensional), Distance between two points, mid-point, centroid of vertices of a triangle.

4.2 Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, symmetric form, normal form, general form), intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.

UNIT V

Geometry of Circle and Software

Circle

5.1 General equation of a circle and its characteristics. To find the equation of a circle, given:

I. Centre and radius
II. Three points lying on it
III. Coordinates of end points of a diameter

Software

5.2 **MATLAB Or SciLab software –** Theoretical Introduction, MATLAB or Scilab as Simple Calculator (Addition and subtraction of values –Trigonometric and Inverse Trigonometric functions) – General Practice

RECOMMENDED BOOKS

1. R. D. Sharma, "Applied Mathematics – I & II for Diploma Courses", Dhanpat Rai Publications.
2. "Mathematics for Class XI", NCERT Publication, New Delhi.
3. "Mathematics for Class XII", NCERT Publication, New Delhi.
4. H. K Dass, "Applied Mathematics for Polytechnics", CBS Publishers & Distributers.
5. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics – I", CBS Publisher, New Delhi.
6. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics –II", CBS Publisher, New Delhi.
7. G. B. Thomas, R. L. Finney, "Calculus and Analytic Geometry", Addison Wesley, Ninth Edition.
8. B S Grewal, "Elementary Engineering Mathematics", Khanna Publishers, Delhi, Thirty-fifth edition.
9. R.K. Jain and S.R.K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, New Delhi, Second Edition, 2003.
10. SS Sabharwal & Dr Sunita Jain, "Applied Mathematics Vol. I & II", Eagle Parkashan, Jalandhar.
11. S Kohli, "Engineering Mathematics Vol. I & II", IPH, Jalandhar.
12. Reena Garg & Chandrika Prasad, "Advanced Engineering Mathematics", Khanna Publishing House, New Delhi
13. R. Pratap, "Getting Started with MATLAB 7", Oxford University Press, Seventh Edition.
14. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in
2. https://www.scilab.org

INSTRUCTIONAL STATREGY

This is theoretical subject and contains five units of equal weight age. Basic elements of algebra, trigonometry and co-ordinate geometry can be taught in the light of their applications in the field of engineering and technology. By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students. Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics related to Algebra, Trigonometry and Coordinate Geometry that the industry requires. Examples to be used should be related to engineering. Useful software MATLAB or open source software SciLab can be taught theoretically by books/online literatures and basic operations can be shown practically with practical software laboratory or small mobile apps of these software or authentic Trial version of MATLAB/ SciLab software. Students should be able to relate to the actual use of these examples and the way mathematical calculations will help them in doing their job.

1.3 APLIED PHYSICS-I

L	P
2	2

RATIONALE

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various technical fields are given prominence in the course content.

COURSE OUTCOMES

After completing this subject, student should be able to:

CO1: Identify physical quantities, select their units and make measurements with accuracy.

CO2: Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications.

CO3: Elaborate scientific work, energy and power, forms of friction and solve problems related to them.

CO4: Comprehend properties of matter and effect of temperature on various matter and phenomenon.

CO5: Demonstrate the use of physical principles and analysis in various technical fields.

DETAILED CONTENTS

UNIT I

Unit and Dimensions

1.1 Definition of Physics, physical quantities- fundamental and derived

1.2 Units: fundamental and derived

1.3 System of units: CGS, FPS, MKS, SI

1.4 Dimension, dimensional formulae and SI units of physical quantities-distance, displacement, area, volume, density, velocity, acceleration, linear momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)

1.5 Dimensional equations, principle of homogeneity of dimensional equation

1.6 Application of dimensional analysis: checking the correctness of physical equation, conversion of system of unit (force, work, acceleration)

UNIT II

Force and Motion

2.1 Scalar and vector quantities– definition and examples, representation of vector, types of vector (unit vector, position vector, co-initial vector, collinear vector, co-planar vector)

2.2 Vector algebra- addition of vectors, Triangle & Parallelogram law (statement and formula only),

2.3 Scalar and vector product (statement and formula only)

2.4 Force and its units, resolution of force (statement and formula only)

2.5 Newton's laws of motion (statement and examples)

2.6 Linear momentum, Law of conservation of linear momentum (statement and examples), Impulse

2.7 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity, centripetal and centrifugal forces (definition and formula only), application of centripetal force in banking of road

2.8 Rotational motion: definition with examples

2.9 Definition of torque, angular momentum, moment of inertia and its physical significance

UNIT III

Work, Power and Energy

3.1 Work- definition, symbol, formula and SI unit, types of work (zero work, positive work and negative work) with example

3.2 Friction– definition and its simple daily life applications

3.3 Power- definition, formula and units

3.4 Energy- definition and its SI unit, examples of transformation of energy.

3.5 Kinetic energy- definition, examples, formula and its derivation

3.6 Potential energy- definition, examples, formula and its derivation

3.7 Law of conservation of mechanical energy for freely falling bodies (with derivation)

3.8 Simple numerical problems based on formula of Power and Energy

UNIT IV

Properties of Matter

4.1 Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body

4.2 Definition of stress and strain, Hooke's law, modulus of elasticity

4.3 Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law

4.4 Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension

4.5 Viscosity: definition, unit, examples, effect of temperature on viscosity

UNIT V

Heat and Temperature

5.1 Definition of heat and temperature (on the basis of kinetic theory)

5.2 Difference between heat and temperature

5.3 Principle and working of mercury thermometer

5.4 Modes of transfer of heat- conduction, convection and radiation with examples.

5.5 Properties of heat radiation

5.6 Different scales of temperature and their relationship

PRACTICAL EXERCISES

1. Familiarization of measurement instruments and their parts (for example - vernier calliper, screw gauge, spherometer, travelling microscope etc.), and taking a reading. (compulsory to all students)
2. To find diameter of solid cylinder using a vernier calliper
3. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.
4. To find the diameter of wire using screw gauge
5. To find thickness of paper using screw gauge.
6. To determine the thickness of glass strip using a spherometer
7. To determine radius of curvature of a given spherical surface by a spherometer.
8. To verify parallelogram law of force
9. To determine the atmospheric pressure at a place using Fortin's Barometer
10. To determine force constant of spring using Hooke's law
11. Measuring room temperature with the help of thermometer and its conversion in different scale.

RECOMMENDED BOOKS

1. "Text Book of Physics for Class XI (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. Dr. HH Lal, "Applied Physics, Vol. I and Vol. II", TTTI Publications, Tata McGraw

Hill, Delhi.
3. AS Vasudeva, "Applied Physics – I", Modern Publishers, Jalandhar.
4. R A Banwait, "Applied Physics – I", Eagle Prakashan, Jalandhar.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.
6. C. L. Arora, "Practical Physics", S Chand Publication.

SUGGESTED WEBSITES

1. http://swayam.gov.in
2. The Physics Classroom
3. https://www.khanacademy.org/science/physics

INSTRUCTIONAL STATREGY

This is hands-on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. Students need to be exposed to use of different sets of units and conversion from one unit type to another. Software may be used to solve problems involving conversion of units. The teacher should explain about field applications before teaching the basics of mechanics, work, power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students. Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

1.4 FUNDAMENTALS OF IT

L	P
2	4

RATIONALE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concepts of information technology and its scope, operating a computer: use of various office management tools, using internet and mobile applications etc. This course is intended to make new students comfortable with computing environment - Learning basic computer skills, learning basic application software tools, Understanding Computer Hardware, Cyber security awareness.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers.
CO2: Handle the Computer / Laptop / Mobiles / Internet Utilities and Install/Configure OS.
CO3: Assemble a PC and connect it to external devices.
CO4: Manage and Use Office practiced Automation Tools.
CO5: Develop worksheets and Prepare presentations.

DETAILED CONTENTS

UNIT I

Basics of Computer

Brief history of development of computers, Definition of Computer, Block diagram of a Computer, Hardware, Software, Booting: Cold and Hot Booting, Interaction between the CPU and Memory with Input/Output devices, Function of CPU and major functional parts of CPU.
Memory, Bit, Nibble, Byte, KB, MB, GB, TB, PB, Functions of memory, Use of storage devices in a Computer, List types of memory used in a Computer, Importance of cache memory, CPU speed and CPU word length

UNIT II

Basic Internet Skills

Understanding browser, Introduction to WWW, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. Advantages of Email, Various email service providers, Creation of email id, sending and receiving emails, attaching documents with email and drive.

Effective use of Gmail, G-Drive, Google Calendar, Google Sites, Google Sheets, Online mode of communication using Google Meet & WebEx.

Unit III

Basic Logic building

Introduction to Programming, Steps involved in problem solving, Definition of Algorithm, Definition of Flowchart, Steps involved in algorithm development, differentiate algorithm and flowchart, symbols used in flowcharts, algorithms for simple problems, flowcharts for simple problems, Practice logic building using flowchart/algorithms

Unit IV

Office Tools

Office Tools like LibreOffice/OpenOffice/MSOffice.

OpenOffice Writer – Typesetting Text and Basic Formatting, Inserting Images, Hyperlinks, Bookmarks, Tables and Table Properties in Writer

Introducing LibreOffice/OpenOffice *Calc*, Working with Cells, Sheets, data, tables, using formulae and functions, using charts and graphics.

OpenOffice Impress – Creating and Viewing Presentations, Inserting Pictures and Tables, Slide Master and Slide Design, Custom Animation.

Unit V

Use of Social Media

Introduction to Digital Marketing – Why Digital Marketing, Characteristics of Digital Marketing, Tools for Digital Marketing, , Effective use of Social Media like LinkedIn, Google+, Facebook, Twitter, etc.: Features of Social media, Advantages and Disadvantages of Social Media.

PRACTICAL EXERCISES

1. Browser features, browsing, using various search engines, writing search queries
2. Visit various e-governance/Digital India portals, understand their features, services offered

3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4. Using Administrative Tools/Control Panel Settings of Operating Systems
5. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6. Explore features of Open Office tools and MS-Office, create documents, create presentation, create spread sheet, using these features, do it multiple times
7. Working with Conversion Software like pdf To Word, Word To PPT, etc.
8. Working with Mobile Applications – Searching for Authentic Mobile app, Installation and Settings, Govt. of India Mobile Applications
9. Creating email id, sending and receiving mails with attachments.
10. Using Google drive, Google calendar
11. Create Flow chart and Algorithm for the following:

a. Addition of n numbers and display result
b. To convert temperature from Celsius to Fahrenheit
c. To find Area and Perimeter of Square
d. Swap Two Numbers
e. find the smallest of two numbers
f. Find whether given number is Even or Odd
g. To print first n even Numbers
h. find sum of series 1+2+3+…..+N
i. print multiplication Table of a number
j. generate first n Fibonacci terms 0,1,1,2,3,5…n (n>2)
k. sum and average of given series of numbers
l. Factorial of number n (n!=1x2x3x…n)
m. Armstrong Number
n. Find whether given number is Prime or not

RECOMMENDED BOOKS

1. R.S. Salaria, “Computer Fundamentals” Khanna Publishing House
2. Ramesh Bangia, “PC Software Made Easy – The PC Course Kit” Khanna Publishing House
3. Online Resources, Linux man pages, Wikipedia
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

5. Vikas Gupta, "Comdex Hardware and Networking Course Kit" Dream Tech press, New Delhi, 2008
6. Sumitabha Das,"UNIX concepts and applications" Tata McGraw Hill, New Delhi, 4th Edition, 2008

SUGGESTED WEBSITES

1. https://nptel.ac.in/courses/106/106/106106222/ - NPTEL Course on Modern Application Development
2. https://onlinecourses.swayam2.ac.in/aic19_de01/preview -
3. https://spoken-tutorial.org/ - Tutorials on Introduction to Computers, HTML, LibreOffice Tools, etc.
4. NOTEPAD++
5. https://tms-outsource.com/blog/posts/web-development-ide/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

1.5 COMPUTER WORKSHOP

L	P
-	6

RATIONALE

The diploma holder needs to understand computer fundamentals and information technology. They should be able to operate basic software related to computer. This course is to provide the students a clear exposure of types of computers, computer components and interfaces, input/output devices and Installation/assembly.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Identify and Handle various hardware components
CO2: Install different types of software and use them appropriately
CO3: Assemble computer components
CO4: Interface various devices to PC/Laptop
CO5: Troubleshoot and Maintain PC/Laptop

PRACTICAL EXERCISES

UNIT I

Introduction

Anatomy of a Computer, Foundations of Modern Information Technology, The Central Processing Unit, How Microprocessors and Memory Chips are Made, Memory, Buses for Input and Output, communication With Peripherals.

Desktop: Identification of desktop and its parts, Hardware, Software and Firmware

Introduction to Mother board, IO and memory expansion slots, Drives, front panel and rear panel

Processors& Bus: Introduction and types of Processor, Introduction to BUS

Laptop: Introduction to Laptop, advantages over Desktops

Laptop components: Adapter – types, Battery – types, Laptop Keyboard and Touchpad

Power Supply: Introduction to online and offline UPS, Difference between online and offline UPS

SMPS: Introduction to SMPS, Study of SMPS Connectors

UNIT II

Memory Storage Devices

Primary Memory: Introduction and types of primary memory (SDRAM, DDR RAM)

Secondary Storage: Hard Disk –Working Principle of IDE, HDD Partition – Formatting, Introduction to SATA and Solid-State Drives (SSD)

Removable Storage: Introduction to CD, DVD, reading & writing operations; Introduction to Blue-ray devices

Flash memory: Flash drives (pen drives), Memory cards and its types

UNIT III

I/O Devices and Interfacing

Inputting Text and Graphics, State of the Art, Input and Output, Pointing Devices, Foundations of Modern Output, Display Screens, Printers, Foundations of Modern Storage, Storage Media, Increasing Data Storage Capacity, Backing up your Data, The Smart Card

Keyboard: Types of keyboards (wired and wireless Keyboard), keyboards connectors, troubleshooting

Mouse: types, connectors, operation of Optical mouse and Troubleshooting.

Printers: Introduction – Types of printers- Dot Matrix, Inkjet, LaserJet, MFP (Multi-Function Printer), advantages, disadvantages, cables and connectors, Troubleshooting.

I/O Ports: Introduction and identification of Serial, Parallel, USB, HDMI.

Displays: Introduction to LED, LCD and TFT Displays, cables and connectors

Graphic Cards: Introduction to different types of Graphics cards

UNIT IV

Maintenance and Trouble Shooting of Desktop and Laptops

Bios-setup: Standard CMOS setup, Advanced BIOS setup, advanced chipset features, PC Bios communication, upgrading BIOS, Flash BIOS -setup.

POST and BOOTING: Definition, POST Test sequence – beep codes.

Diagnostic Software and Viruses: Computer Viruses, Precautions, Anti-virus Software, Working of Antivirus software's

General troubleshooting of various peripheral devices (printer, pc, laptop, keyboard, mouse, monitor, hard disk)

UNIT V

Assembling and Installation of Hardware/Software

Assembling and Disassembling of PC

Installation and Troubleshooting: Formatting, Partitioning and Installation of OS: Windows and Linux
Installation of peripheral devices: Printers, scanner
Installation of software's: application software, systems software

RECOMMENDED BOOKS

1. Stephen J, Bigelow, "Trouble shooting, maintaining and repairing PCs", Tata McGraw-Hill, New Delhi, 2005.
2. Stanley & Hall, "PC Data Handbook, BPB Publications, New Delhi, 2007.
3. Govindarajulu, "IBM PC and clones Hardware trouble shooting and maintenance, Tata McGraw-Hill, New Delhi, 2007.
4. Scott Muller, "Upgrading and Repairing PCs", Microtech Publications, Dubai, 2006.
5. Ronald L.Krutz, "Interfacing Techniques in Digital Design with Emphasis on Microprocessors", John Wiley & Sons New York, 2004.

SUGGESTED WEBSITES

1. PC Hardware — Open & Free – OLI (cmu.edu)
2. https://www.classcentral.com/course/build-a-computer-3234 : Free Online Course: Build a Modern Computer from First Principles: From Nand to Tetris (Project-Centered Course) from Coursera/Class Central

INSTRUCTIONAL STRATEGY

This is hands on practice based workshop and topics taught in the class should be practiced in the workshop regularly for development of required skills in the students. This workshop contains five units of equal weight age.

1.6 ELECTRONICS WORKSHOP

L	P
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RATIONALE

Electronic practice is the backbones of the real work situation, which helps in development and enhancement of relevant skill required in engineering. The main objective of this course is to impart knowledge of different electronics components used in electronic circuits and develop the ability to understand datasheets. The course also describes various electronic components for different applications.

COURSE OUTCOMES

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

CO1: Identify electronics components like resistors, capacitors, diodes, transistors etc.
CO2: Implement soldering and de-soldering on electronic circuit interconnections.
CO3: Identify different active electronic components and assemble circuits on breadboard.
CO4: Use measuring instruments like Multimeter, Function generator, Power Supply & DSO.
CO5: Able to test various electronic circuitry and batteries.

PRACTICAL EXERCISES

UNIT I

Basic Electronic Components

1.1 Concept of Resistors, Color Coding, Tolerance, Maximum power rating, Application of LDR.
1.2 Classification of Capacitors, Coding of capacitors-using numerals, directly printed values on capacitors, Ceramic capacitor and Electrolytic capacitor.
1.3 Concept of Inductors
1.4 Testing of components using Multi meter/LCR Q-meter

UNIT II

Soldering & De-soldering

2.1 Identify different types of soldering guns and practice soldering of different electronic active and passive components and IC bases on lug boards and PCBs.

2.2 Join the broken PCB track and test
2.3 Practice de-soldering using pump and wick
2.4 Prepare component for soldering.
2.5 Demonstrate soldering and de-soldering using soldering and de-soldering stations.

UNIT III

Active Electronic Components

3.1 Identify different types of mains transformers and their testing.
3.2 Identify the primary and secondary transformer windings and test the polarity.
3.3 Identify different sizes, shapes of cores used in low capacity transformers.
3.4 Measure the primary and secondary voltage of different transformers.
3.5 PN junction diode: Terminal Identification, setting on bread board and testing.
3.6 Zener diode: Terminal Identification, setting on bread board and testing.
3.7 LED, Photo diode :Terminal Identification, setting on bread board and testing.
3.8 Integrated Circuits (ICs) like 7404, 7408, 7432, 7805, 555, 741: Pin diagram, Identification, setting on bread board and testing.
3.9 Switches, Application of Toggle, Rotary, push to on & push to off
3.10 Relays and application of General purpose relay

UNIT IV

Electronic Testing Equipments

4.1 Power Supply, DC power supply, Concept of Dual power supply
4.2 Cathode Ray Oscilloscope (CRO), CRO probes, Front panel controls, AC/DC voltage measurement, Frequency measurement, wave form generation.
4.3 Function Generator, Front panel controls, Functions: sine wave, square wave, triangular wave and Amplitude measurement.
4.4 Digital Multi Meter, Front panel controls of DMM
4.5 Study of AC and DC Waveforms
4.6 Construction of various electronic circuits on breadboard Circuits like: rectifiers, filter circuits, clipper, clamper, transistor amplifiers, logic gates, LED driver circuit, power supply, etc
4.7 Testing of outputs of various electronic circuits using test Equipment.

UNIT V

AC and Electrical Cables

5.1 Identify the Phase, Neutral and Earth on power Socket.
5.2 Construct a test lamp and use it to check mains.

5.3 Use a Tester to monitor AC power.
5.4 Measure the voltage between phase and ground and rectify earthing.
5.5 Identify and test different AC mains cables.
5.6 Skin the electrical wires /cables using the wire stripper and cutter. .
5.7 Prepare the mains cable for termination.
5.8 Measure AC and DC voltages using multi meter
5.9 Replace the fuse, battery for the given multimeter

RECOMMENDED BOOKS

1. Prof. D.Chhatopadhyay & Prof. P.C Rakshit, "Basic Electronics" New Age International (P) Ltd. Publishers, 2010.
2. Zber, "Basic Electronics Lab Manual", Mc Graw Hill India, Seventh Edition, 2001.
3. Stan Gibilisco & Simon Monk, "Electricity & Electronics", Mc Graw Hill Education Sixth Edition, 2016.
4. Marc De Vinck "Getting Started with Soldering", Shroff/Maker Media, First Edition, 2018.

SUGGESTED WEBSITES

1. www.electronics.wisc-online.com
2. www.electronicsforu.com
3. https://www.electronics-tutorials.ws/design

INSTRUCTIONAL STRATEGY

This is hands-on practice based workshop for development of required skills in the students. There are five units of equal weightage. The teacher should also engage the students for various Hands on Practice/Training of Students during Educational Tour, Seminar/ Assignment Event, Students Quiz.

SECOND SEMESTER

SECOND SEMESTER

2.1	Advances in IT	33 - 36
2.2	*Applied Mathematics-II	37 - 40
2.3	*Applied Physics - II	41 - 44
2.4	Analog Electronics	45 - 47
2.5	*Engineering Graphics	48 - 51
2.6	Multimedia Applications	52 - 54
2.7	*Environmental Studies & Disaster Management	55 - 57

2.1 ADVANCES IN IT

L	P
3	2

RATIONALE

A scripting language or script language is a programming language for a runtime system that automates the execution of tasks that would otherwise be performed individually by a human operator. The purpose of the course is to prepare students for building scripts that control a sequence of program steps such as those used in developing testing and deploying software. Modern scripting languages like Java Script are used as an example of scripting language in this course.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Describe the need of HTML and its applications in Web Development
CO2: Design and Develop Websites using HTML
CO3: Develop interactive Internet applications
CO4: Create interactive applications in Java script.
CO5: Design Internet Applications using Java Script

DETAILED CONTENTS

UNIT I

HTML Fundamentals

Introduction to HTML- Characteristics of HTML language, Structure of a HTML page. Describing Tags. How to create a HTML document? Viewing HTML document, commonly used web browsers. HTML4 – List of Tags in HTML4, HTML tags: Container elements, empty elements. Using tags, Heading, Paragraph, Changing appearance of text (bold, italics, underline, subscript, superscript), center tag, title tag. Changing font size, text color and background, Changing the background color and background of HTML page, Top marging, left margin, & nbsp,<hr> and its attributes.

UNIT II

Working with HTML

Using list and images: Unordered lists: type attribute. Ordered lists: start attribute, type attribute, value attribute. Nested lists. Inserting images, aligning an image, centering image, adding border to a image, alternate text, setting height and width, adding space around the image. Working with links: Anchor elements, creating hyperlink to a document. Internal linking and external linking.

UNIT III

Designing with HTML

Creating tables: Creating a table, attributes of table tag (BORDER, BORDERCOLOR, BGCOLOR, ALIGN, CELLSPACING, CELLPADING, WIDTH) Attributes of table row <tr> and table data <td> tag (BORDERCOLOR, BGCOLOR, ALIGN, VALIGN, HEIGHT). Row span and Col span.

Working with Frames. Use and creating frames. Introduction to Forms

Steps for developing a Website.

UNIT IV

JAVA Script Overview and Core Language Features

Introduction to Scripting Languages, JavaScript Implementation-ECMAScript-DOM-BOM-Values-Variables-Literals-Constants-Operators and Expressions-Regular Expressions Conditional Branching Statements- Conditional Looping Statements-Functions-Creating Simple Java Script page-Adding JavaScript page into HTML

UNIT V

Document Access

The Document Object Model: Mapping your HTML -Text Nodes-Attribute Nodes Accessing the Nodes you Want: Finding an Element by ID-Finding Elements by Tag Name-Finding Elements by Class Name; Navigating the DOM Tree-Interacting with Attributes - Changing Styles: Changing Styles with Class and Id-Font-Table Layout-Text Properties- Padding, Borders and Margins

PRACTICAL EXERCISES

PART A: HTML

1. Creating an HTML document
2. Working with Mark up Tags
3. Working with Heading-Paragraphs

4. Working with Text
5. Working with Lists
6. Working with Tables and Frames
7. Working with Hyperlinks
8. Working with Images and Multimedia
9. Working with Forms and controls.

PART B: Java Script

1. Create a HTML form with Name, Password and Confirm Password Write a Java script to validate if Password and Confirm Password field values are same.
2. Write a Java script to animate a simple Image using set Timeout.
3. Write a Java script to illustrate auto refreshing in your own Web page.
4. Develop a simple calculator using Java script.
5. Write a Java script to illustrate the use of cookies in your own Web page.
6. Write a Java script to prompt two integer numbers from the user and display the sum of them.
7. Write a Java script to greet the user with "Good Morning" or "Good Afternoon" or "Good Evening" depending on the current time.
8. Generate a Digital Clock using Java script.
9. Write a Java script to change the background color of the image in definite time intervals.

RECOMMENDED BOOKS

1. Nicholas C.Zakas, "Professional JavaScript for Web Developers", Wrox-Wiley Dreamtech, 2005.
2. Thomas A.Powell, "HTML&XHTML –The Complete Reference", Tata McGraw Hill, 2006
3. JavaScript: The Definitive Guide-By David Flannagan;2003
4. John R Vacca, "JavaScript Development", Morgan Kaufmann 2004.
5. Paul Lomax, Matt Childs, Ran Petrusha, "VBScript in a nutshell", O'Reilly, 2005.
6. John Pollac, "JavaScript", McGraw Hill, 2005.
7. Adrian Kingley, "VBScript Programmers Reference", Wrox, 2004.

SUGGESTED WEBSITES

1. https://nptel.ac.in/courses/117/106/117106113/
2. https://nptel.ac.in/courses/106/105/106105084/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

2.2 APPLIED MATHEMATICS – II

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RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus, Integral calculus and Differential Equations have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

COURSE OUTCOMES

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

CO1: Formulate the engineering problems into mathematical format with the use of differential equations and differential

C02: Use the differentiation and Integration in solving various Mathematical and Engineering problems.

CO3: Calculate the approximate area under a curve by applying integration and numerical methods.

CO4: Understand the purposes of measures of central tendency and calculate the measures of central tendency (mode, median, mean) for a set of data.

CO5: Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software.

DETAILED CONTENTS

UNIT I

Differential Calculus

1.1 Definition of function; Concept of limits (Introduction only) and problems related to four standard limits only.

1.2 Differentiation of x^n, sin x, cos x, e^x by first principle.

1.3 Differentiation of sum, product and quotient of functions.

UNIT II

Differential Calculus and Its Applications

2.1 Differentiation of trigonometric functions, inverse trigonometric functions. Logarithmic differentiation, successive differentiation (upto 2nd order)

2.2 Application of differential calculus in:

(a) Rate measures (b) Maxima and minima

UNIT III

Integral Calculus

3.1 Integration as inverse operation of differentiation with simple examples.

3.2 Simple standard integrals and related problems, Integration by Substitution method and Integration by parts.

3.3 Evaluation of definite integrals with given limits.

Evaluation of $\int_0^{\pi/2} \sin^n x.\, dx$, $\int_0^{\pi/2} \cos^n x\, dx$, $\int_0^{\pi/2} \sin^m x\, \cos^n x\, dx$

using formulae without proof (m and n being positive integers only) using pre-existing mathematical models.

UNIT IV

Application of Integration, Numerical Integration and Differential Equations

4.1 Applications of integration: for evaluation of area under a curve and axes (Simple problems).

4.2 Numerical integration by Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule using pre-existing mathematical models.

Differential Equations

4.3 Definition, order, degree, Type of differential Equations, linearity, Formulation of ordinary differential equation (up to 1^{st} order), solution of ODE (1^{st} order) by variable separation method.

UNIT V

Statistics and Software

Statistics

5.1 Measures of Central Tendency: Mean, Median, Mode

5.2 Measures of Dispersion: Mean deviation, Standard deviation

Software

5.3 SciLab software – Theoretical Introduction.

5.4 Basic difference between MATLAB and SciLab software,

5.5 Calculations with MATLAB or ScilLab - (a) Representation of matrix (2×2 order), (b) Addition, Subtraction of matrices (2×2 order) in MATLAB or SciLab

RECOMMENDED BOOKS

1. R. D. Sharma, "Applied Mathematics – I & II for Diploma Courses", Dhanpat Rai Publications.
2. "Mathematics for Class XI", NCERT Publication, New Delhi.
3. "Mathematics for Class XII", NCERT Publication, New Delhi.
4. H. K Dass, "Applied Mathematics for Polytechnics", CBS Publishers & Distributers.
5. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics –I", CBS Publisher, New Delhi.
6. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics –II", CBS Publisher, New Delhi.
7. G. B. Thomas, R. L. Finney, "Calculus and Analytic Geometry", Addison Wesley, Ninth Edition.
8. B S Grewal, "Elementary Engineering Mathematics", Khanna Publishers, Delhi, Thirty-fifth Edition.
9. R.K. Jain and S.R.K. Iyengar, "Advanced Engineering Mathematics" Narosa Publishing House, New Delhi, Second Edition, 2003.
10. SS Sabharwal & Dr Sunita Jain, "Applied Mathematics Vol. I & II", Eagle Parkashan, Jalandhar.
11. S Kohli, "Engineering Mathematics Vol. I & II", IPH, Jalandhar.
12. Reena Garg & Chandrika Prasad, "Advanced Engineering Mathematics", Khanna Publishing House, New Delhi.
13. R. Pratap, "Getting Started with MATLAB 7", Oxford University Press, Seventh Edition.
14. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. https://www.scilab.org
2. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is theoretical subject and contains five units of equal weight age. Basic elements of Differential Calculus, Integral Calculus, and Differential Equations can be taught in the light of their applications in the field of engineering and technology. By laying more stress on applied part, teachers can also help in providing continuing education base to the students. Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics that the industry requires. For example they need to know how to use mathematical models that use integration as opposed to learning how integration can be used. Useful authenticated software MATLAB or open source software SciLab can be taught theoretically by books/online literatures and basic operations can be shown practically with practical software laboratory or small mobile apps of these software or authentic Trial version of MATLAB/ SciLab software. Diploma students need to know which tools to use and how to do the job.

2.3 APPLIED PHYSICS-II

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RATIONALE

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various technical fields are given prominence in the course content to prepare students for various technical applications.

COURSE OUTCOMES

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

CO1: Differentiate between types of waves and their motion.
CO2: Illustrate laws of reflection and refraction of light.
CO3: Demonstrate competency in phenomena of electrostatics and electricity.
CO4: Characterize properties of material to prepare new materials for various technical applications.
CO5: Demonstrate a strong foundation on Modern Physics to use at various technical applications.

DETAILED CONTENTS

UNIT I

Wave Motion and its Applications

1.1 Waves: definition, types (mechanical and electromagnetic wave)
1.2 Wave motion- transverse and longitudinal with examples, terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length
1.3 Simple harmonic motion (SHM): definition, examples
1.4 Cantilever: definition, formula of time period (without derivation)
1.5 Free, forced and resonant vibrations with examples
1.6 Sound waves: types (infrasonic, audible, ultrasonic) on the basis of frequency, noise, coefficient of absorption of sound, echo

UNIT II

Optics

2.1 Reflection and refraction of light with laws, refractive index

2.2 Lens: introduction, lens formulae (no derivation), power of lens and simple numerical problems

2.3 Total internal reflection and its applications, critical angle and conditions for total internal reflection

2.4 Superposition of waves (concept only), definition of Interference, Diffraction and Polarization of waves

2.5 Introduction to Microscope, Telescope and their applications

UNIT III

Electrostatics and Electricity

3.1 Electric charge, unit of charge, conservation of charge

3.2 Coulomb's law of electrostatics

3.3 Electric field, electric lines of force (definition and properties), electric field intensity due to a point charge

3.4 Definition of electric flux, Gauss law (statement and formula)

3.5 Capacitor and capacitance (with formula and unit)

3.6 Electric current and its SI Unit, direct and alternating current

3.7 Resistance, conductance (definition and unit)

3.8 Series and parallel combination of resistances

3.9 Ohm's law (statement and formula)

UNIT IV

Classification of Materials and their Properties

4.1 Definition of energy level, energy bands

4.2 Types of materials (conductor, semiconductor, insulator and dielectric) with examples, intrinsic and extrinsic semiconductors (introduction only)

4.3 Introduction to magnetism, type of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials with examples

4.4 Magnetic field, magnetic lines of force, magnetic flux

4.5 Electromagnetic induction (definition)

UNIT V

Modern Physics

5.1 Laser: introduction, principle, absorption, spontaneous emission, stimulated emission, population inversion

5.2 Engineering and medical applications of laser

5.3 Fibre optics**:** introduction to optical fibers (definition, principle and parts), light propagation, fiber types (mono-mode, multi-mode), applications in medical, telecommunication and sensors

5.4 Nanotechnology: introduction, definition of nanomaterial's with examples, properties at nanoscale, applications of nanotechnology (brief)

PRACTICAL EXERCISES

1. Familiarization with apparatus (resistor, rheostat, key, ammeter, voltmeter, telescope, microscope etc.)
2. To find the time period of a simple pendulum.
3. To study variation of time period of a simple pendulum with change in length of pendulum.
4. To determine and verify the time period of Cantilever.
5. To verify Ohm's laws by plotting a graph between voltage and current.
6. To study colour coding scheme of resistance.
7. To verify laws of resistances in series combination.
8. To verify laws of resistance in parallel combination.
9. To find resistance of galvanometer by half deflection method.
10. To verify laws of reflection of light using mirror.
11. To verify laws of refraction using glass slab.
12. To find the focal length of a concave lens, using a convex lens.

RECOMMENDED BOOKS

1. "Text Book of Physics for Class XII (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. Dr. HH Lal, "Applied Physics, Vol. I & II", TTTI Publications, Tata McGraw Hill, Delhi.
3. AS Vasudeva, "Applied Physics –II", Modern Publishers, Jalandhar.
4. R A Banwait, "Applied Physics – II", Eagle Prakashan, Jalandhar.
5. N Subrahmanyam, Brij Lal and Avadhanulu, "A text book of OPTICS", S Chand Publishing, New Delhi.

6. E-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.
7. M H Fulekar, "Nanotechnology: Importance and Applications", IK International Publishing House (P) Ltd., New Delhi.
8. C. L. Arora, "Practical Physics", S Chand Publication.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STATREGY

This is hands-on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. Students need to be exposed to use of different sets of units and conversion from one unit type to another. Software may be used to solve problems involving conversion of units. The teacher should explain about field applications before teaching the basics of mechanics, work, power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students. Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

2.4 ANALOG ELECTRONICS

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RATIONALE

This course will introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier to give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers. It will familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

COURSE OUTCOMES

After undergoing the subject, student will be able to:

CO1: Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.

CO2: Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances.

CO3: Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.

CO4: Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.

DETAILED CONTENTS

UNIT I

Semiconductors and Diodes: Electrons- free and valence. Conductors, Insulators, and Semiconductors- definition & energy band diagrams. Properties of semiconductors. Meaning of Hole current, electron-hole pairs, recombination, doping, acceptor and donor impurities. Intrinsic and Extrinsic, N and P type semiconductors. Diode- formation, depletion region, VI Characteristics, ratings, types and applications. Zener diode- reverse bias characteristics, voltage regulation, shunt voltage regulator, and applications. Varistor and Thermistor working and applications.

UNIT II

Transistors and MOSFETs: Transistors- definition, terminals, types, symbols, formation of NPN and PNP, ratings. Transistor biasing- definition, importance, list types, stabilisation, thermal runaway, heat sink, and voltage divider method. List configurations and applications. Alpha and Beta- definitions, relation. CE input and output characteristics- cut off, saturation, and active regions. Transistor as a switch. List applications. FET- definition, types. MOSFET- definition, types, symbols. N type enhancement mode- construction, working, characteristics, switch. List applications and ratings. Differentiate BJT and MOSFET.

UNIT III

Rectifiers, filters and regulators: Regulated power supply- block diagram and applications. Rectifiers- definition, half wave, centre tapped and bridge full wave rectifier, efficiency, ripple factor, PIV, ratings. Filters- definition, necessity, C and PI filters, Regulator-definition, working of 7805, operating voltages- 7809, 7812, 7905, 7912.

UNIT IV

Amplifiers and Oscillators: Amplifier- definition, faithful amplification, classification based on configuration, power, and frequency. Transistor CE amplifier with biasing. Working of class A, B, C, and Push pull amplifier. Two stage RC coupled amplifier working, gain in dB, frequency response. Feed back- definition, types, advantages and disadvantages, applications. Oscillators- definition, classification, LC tank circuit, criteria. RC phase shift and crystal oscillator- working, applications. CRT- construction, working and applications.

UNIT V

OP-AMP and Timers: OPAMP– definition, block diagram, operation, characteristics, applications, µA 741 pin diagram. Definitions of virtual ground, CMRR and Slew rate. OPAMP applications– inverting, integrator, differentiator, summer, voltage follower, and comparator. Filters- definition, Working- low pass, high pass passive and active filters, applications. Timers– block diagram, pin diagram of 555, duty cycle, time constant, applications. Multi-vibrators- Astable and monostable using 555.

PRACTICAL EXERCISES

1. Familiarity with working knowledge of the following Instruments. (a) CRO (b) Multimeter (c) Function generator (d) Regulated power supply (e) Active passive components (f) Bread Board
2. Study of V-I Characteristics of a Diode.

3. Study and draw the characteristics of half wave and full wave rectifiers.
4. Study and draw the characteristics of rectifier filter circuit.
5. Study of Clipping & Clamping circuit.
6. Study zener diode characteristics.
7. Study zener diode as voltage regulator.
8. Study the characteristics of transistor in Common Base configuration.
9. Plot and study the input and output characteristics of BJT in common emitter configuration.
10. Graphical determination of small signal hybrid parameter of BJT.
11. Study and draw the characteristics of FET in common source configuration
12. Study characteristics of SCR.
13. Study of characteristics of DIAC.
14. Plot V-I characteristic of TRIAC.
15. Study and draw the characteristics of FET in common drain configuration.
16. Study the Series and Shunt Voltage Regulator.
17. Study of frequency response of active filters HP, LP & BP.

RECOMMENDED BOOKS

1. Electronics Principles and applications by Charles A Schuler and Roger L Tokhiem, Sixth Edition, Mc. Graw Hill , 2008.
2. Electronics Principles by Malvino, Mc. Graw Hill, Third edition. 2000.
3. Electronics Devices and Circuits by Allan Mottershed, PHI Learning Pvt. Ltd., First Edition.
4. Electronics Analog and Digital by I. J. Nagrath, PHI Learning Pvt. Ltd., 2013 Edition.
5. Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Learning Pvt. Ltd., Fourth Edition.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

2.5 ENGINEERING GRAPHICS

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RATIONALE

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawings is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

COURSE OUTCOMES

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

CO1: Draw Orthographic views of different objects viewed from different angles..

CO2: Draw and interpret sectional views of an object which are otherwise not visible in normal view.

CO3: Draw Isometric views of different solids and develop their surfaces.

CO4: Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances /fittings.

CO5: Draw orthographic views of different objects by using basic commands of AutoCAD.

DETAILED CONTENTS

UNIT I

1. Introduction to Engineering Drawing and Graphics

1.1 Introduction to use and care of drawing instruments, drawing materials, layout and sizes of drawing sheets and drawing boards.

1.2 Symbols and conventions-

a) Conventions of Engineering Materials, Sectional Breaks and Conventional lines.
b) Civil Engineering Sanitary fitting symbols
c) Electrical fitting symbols for domestic interior installations.

1.3 Geometrical construction-geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagons, pentagons bisecting a line and arc , division of line and circle with the help of drawing instruments.

2. Technical Lettering of Alphabet and Numerals

Definition and classification of lettering, Free hand (of height of 5,8,12 mm) and instrumental lettering (of height 20 to 35 mm): upper case and lower case, single and double stroke, vertical and inclined (Gothic lettering) at 75 degree to horizontal and with suitable height to width ratio 7:4.

3. Dimensioning

3.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions).

3.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., countersunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches.

4. Scales

4.1 Scales –Needs and importance (theoretical instructions), Type of scales, Definition of Representative Fraction (R.F.) and Length of Scale.

4.2 To draw/construct plain and diagonal scales.

UNIT II

1 Orthographic Projections

1.1 Theory of orthographic projections (Elaborate theoretical instructions).

1.2 Three views of orthographic projections of different objects of given pictorial view of a block in 1st and 3rd angle.

1.3 Projection of Points in different quadrant

1.4 Projection of Straight Line (1^{st} angle)

i. Line parallel to both the planes.

ii. Line perpendicular to any one of the reference plane and parallel to others

iii. Line inclined to any one of the references and parallel to another plane.

1.5 Projection of Plane – Different lamina like square rectangular, triangular, circle and Hexagonal pentagon. Trace of planes (HT and VT).

1.6 Identification of surfaces.

2. Sectioning

2.1 Importance and salient features

2.1 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections (theoretical only).

2.3 Orthographic sectional views of different objects.

UNIT III

1. Introduction of projection of right solids such as prism & pyramid (square, Pentagon, Hexagonal) cube, cone & cylinder (Axes perpendicular to H.P and parallel to V.P.)
2. Introduction of sections of right solids - Section planes, Sections of Hexagonal prism, pentagon pyramid, cylinder and cone (Section plane parallel to anyone reference planes and perpendicular to V.P. and inclined to H.P.)
3. Development of Surfaces – Development of lateral surfaces of right solids like cone, cylinder, pentagonal prism, pyramid and hexagonal pyramid (Simple problems)

UNIT IV

Isometric Views

1. Fundamentals of isometric projections and isometric scale.
2. Isometric views of different laminas like circle, pentagon and hexagon.
3. Isometric views of different regular solids like cylinder, cone, cube, cuboid, pyramid and prism.
4. Isometric views from given different orthographic projections(front, side and top view)

UNIT V

Introduction to AutoCAD

Basic introduction and operational instructions of various commands in AutoCAD. At least two sheets of different objects on AutoCAD (given pictorial/isometric view of a block). AutoCAD skill of student is evaluated in internal assessment only not in external exam.

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co.,Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt;Charotar Publishing House Pvt. Ltd.,Anands
4. Engineering Drawing and Graphics using AutoCAD by T. Jeyapoovan,Vikas Publishing House Pvt, Ltd Noida.
5. A Text Book of Engineering Drawing by S.R.Singhal and O.P.Saxena, Asian Publisher, Delhi
6. Engineering Drawing by RB Gupta, Satya Prakashan, New Delhi

INSTRUCTIONAL STRATEGY

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. First angle projection is to be followed. Minimum of 20 sheets to be prepared and at least 2 sheets on AutoCAD**.** Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students. This subject contains five units of equal weight age.

2.6 MULTIMEDIA APPLICATIONS

L	P
2	4

RATIONALE

This course introduces how multimedia can be used in various application areas. It provides a solid foundation to the students so that they can identify the proper applications of multimedia, evaluate the appropriate multimedia systems and develop effective multimedia applications. It gives a detailed view of various classification, audio technologies, texts, and animations.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Develop a well-designed, interactive Web site with respect to current standards and practices

CO2: Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language

CO3: Determine the appropriate use of interactive verses standalone Web applications

CO4: Design time-based and interactive multimedia components

CO5: Identify issues and obstacles encountered by Web authors in deploying Web-based application

DETAILED CONTENTS

UNIT I

Definitions and Classification

Multimedia Hardware- Multimedia Software–Meetings the analog signals – Search of Digital recording – CD ROMs.

UNIT II

Digital Audio Technologies

Sound Cards – Playback and Recording – MIDI – working with MIDI.

UNIT III

Multimedia texts

Coloring – Digital Imaging Fundamentals – Digital Image Development and Editing.

UNIT IV

Animation fundamentals

Animation Software tools – Animation Techniques – Digital video fundamentals – Digital video production techniques.

UNIT V

M/M Project Design Concepts

Authoring – Project Planning and Costing – Multimedia team.

PRACTICAL EXERCISES

2D Animation software (Adobe Flash)

Study of Adobe Flash Tools; Frame by Frame Animation; Motion Tweening; Simple Tweening; Using Guide Layer; Shape Tweening; Simple Tweening; Shape Hint; Masking; Single Layer Masking; Double Layer Masking; Movie Clip; Buttons; Publishing of Flash Movie

Action Scripts

1. Simple functions: Stop, Play, Go to, Get URL, Call
2. Properties - _x, _y, _x Scale, _y Scale, _alpha
3. Event handling

Image Editing Software (Adobe Photoshop)

Study of Adobe Photoshop tools

2. Image editing
3. Applying special effects.

RECOMMENDED BOOKS

1. Multimedia Magic – S.Gokul - BPB Publications, 2008.
2. Multimedia – Making it work – T. Vaughan – Osborne McGraw Hill - 2005.
3. Fundamentals of Multimedia – Drew – Pearson Education – 2006.
4. Multimedia Systems – Buford – Pearson Education – 2007.

SUGGESTED WEBSITES

1. https://nptel.ac.in/courses/117/105/117105083/
2. https://nptel.ac.in/courses/106/106/106106200/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

2.7 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

L	P
2	-

RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industrial and construction activities so that he/she may help in balancing the ecosystem and controlling pollution by various control measures. The course is intended to provide a general concept in the dimensions of environmental pollution and disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.

COURSE OUTCOMES

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

CO1: Comprehend the importance of sustainable ecosystem
CO2: Demonstrate interdisciplinary nature of environmental issues
CO3: Implement corrective measures for the abatement of pollution.
CO4: Identify the role of non-conventional energy resources in environmental protection.
CO5: Manage various types of disasters

DETAILED CONTENTS

UNIT I

Introduction

1.1 Basics of ecology, eco system- concept, and sustainable development, Sources, advantages, disadvantages of renewable and nonrenewable energy.
1.2 Rain water harvesting
1.3 Deforestation – its effects & control measures

UNIT II

Air and Noise Pollution

2.1 Air Pollution: Source of air pollution. Effect of air pollution on human health, economy, Air pollution control methods.

2.2 Noise Pollution: Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimizing noise pollution.

UNIT III

Water and Soil Pollution

3.1 Water Pollution: Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of DO, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.

3.2 Soil Pollution :Sources of soil pollution, Effects and Control of soil pollution, Types of Solid waste- House hold, Industrial, Agricultural, Biomedical, Disposal of solid waste, Solid waste management E-waste, E – waste management

UNIT IV

Impact of Energy Usage on Environment

Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings, Concept of Carbon Credit & Carbon footprint.

UNIT V

Disaster Management

A. Different Types of Disaster:

Natural Disaster: such as Flood, Cyclone, Earthquakes and Landslides etc.

Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea Rail & Road), Structural failures(Building and Bridge), War & Terrorism etc.

B.Disaster Preparedness:

Disaster Preparedness Plan

Prediction, Early Warnings and Safety Measures of Disaster

Psychological response and Management (Trauma, Stress, Rumour and Panic)

RECOMMENDED BOOKS

1. Environmental Studies by S.C. Sharma & M.P. Poonia, Khanna Publishing House, New Delhi
2. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi

4. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
5. Environmental Engineering and Management by Suresh K Dhamija; S K Kataria and Sons, New Delhi.
6. E-books/e-tools/relevant software to be used as recommended by AICTE/BTE/NITTTR, Chandigarh.
7. Disaster Management by Dr. Mrinalini Pandey, Wiley India Pvt. Ltd.
8. Disaster Science and Management by Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies and Disaster Management like expert lectures, seminars, visits etc. may also be organized This subject contains five units of equal weight age.

EFFECTIVE IMPLEMENTATION
&
EVALUATION TOOLS

28. ASSESMENT TOOLS AND CRITERION

The assessment is carried out by conducting:

1. Formative assessments
2. Summative assessments

1. FORMATIVE ASSESSEMENT

The formative assessment will be evaluated on the basis of the internal assessments for theory subjects and practical by the concerned teachers for evaluating the knowledge and skill acquired by students and the behavioral transformation of the students. This internal assessment is primarily carried out by collecting evidence of competence gained by the students by evaluating them at work based on assessment criteria, asking questions and initiating formative discussions to assess understanding and by evaluating records and reports, and sessional marks are awarded to them.

2. SUMMATIVE ASSESSMENT

The summative assessment will include end semester examination for theory part for each candidate and practical examination with viva voice. Each Performance Criteria will be assigned marks proportional to its importance and proportion of marks for Theory and Skills Practical for each subject should be laid down. The following assessment tools are used for effective student evaluation:

1. Theory
2. Practical
3. Minor & Major Project
4. Massive Open Online Courses (MOOCs)
5. Viva Voce
6. Summer Industrial / In House Training
7. Professional Industrial Training

1. Theory Assessment

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course/subject, and their ability to apply learnt principles and solve problems.

The formative evaluation for theory subjects may be caused through

i. Sessional /class-tests,
ii. Quizzes,
iii. Assignments,
iv. Seminars / Presentations
v. Attendance
vi. Case Studies

For Summative evaluation of theory, the question paper may comprise of three sections.

i. It should contain objective type question and multiple choice questions. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

ii. It should contain short answer questions.

iii. Descriptive type questions, with some internal choice of the questions set may be given in this section

2. Practical Assessment

Evaluation of students performance in practical work (Laboratory experiments, Workshop practical /field exercises) aims at assessing students ability to apply or practice the concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. This will comprise of a creation of mock environment, wherever applicable in the skill lab which is equipped with all required equipment for development of desired skills. Candidate's soft skills, communication, aptitude, safety consciousness, quality consciousness etc. will be ascertained by observation and will be marked in observation checklist along with the assessment of Job carried out in labs and maintenance of Lab Record Files.

Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, general behavior and it should be followed by viva-voce of the relevant subject. The end product will be measured against the specified dimensions and standards to gauge the level of skill achievements

3. Minor and Major Project Assessment

The purpose of evaluation of project work is to assess student's ability to apply, in an integrated manner, knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The project work assigned should be of relevance to the core skill, state of the art topics and the project areas that are pertaining to enhance job skill and enhance occupational opportunities. For both, minor and major project, Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, nature and relevance of project and general behavior.

The formative assessment should include the continuous assessment based on the work allocated and mid semester viva voice or presentation. The final assessment will be the combination of the project undertaken, report submission and should be followed by viva-voce of the relevant subject.

In case of the assessment of this component, the team of examiners should be constituted and half of the examiners in the team should be invited from outside of the institute as expert for conducting the examination.

4. Massive Open Online Courses (MOOCs) Assessment

Open Elective and Multi-Disciplinary Elective may be covered through Massive Open Online Courses (MOOCs) to promote self learning. These platforms promise open, online courses to massive numbers of students as they are free to join; they provide a wide range of courses. They allow for space and time flexibility and their participants can benefit from various online communication tools and access to quality content.

The coordinating Department/Centre/Office shall monitor every student to adopt the courses online of their choice and preference on Swayam portal. The duration of courses will vary depending on the level and credit points. Courses offered in the duration of 4-10 weeks for 2 to 3 credits at diploma level are to be opted. Students can get a certificate after registering and attending the classes and submitting the assignments/quizzes and qualifying nationwide conducted written exam.

On successful completion of each course, the institution offering the MOOCs course would issue the certificate, along with the number of credits and grades, through which the student can get credits transferred into his marks certificate issued by the parent institution. There may be standard norms for the host Institution to conduct the course that may include continuous evaluation through assignments, online quizzes, case studies, online writing exercises, term examinations, student feedback, online forum management, etc. The coordinating

Department/Centre/Office of the respective department shall monitor every student and submit to the Office of Examinations, a score sheet before the close of the even semester.

5. Viva Voce Assessment

This tool will be used to assess the conceptual understanding and the behavioral aspects as regards the job role and the specific task at hand. It will also include questions on safety, quality, environment and equipment's etc. Ask questions on non-prescribed tasks to ensure that the learners have complete knowledge on the assessment

6. Summer / In-house Training Assessment

The two mandatory internships after First and Second Year of are to be assessed in 3rd and 5th semester subsequently. The trainng should be preferably done in the industry but can also be in house depending upon the stream and availability of resources in and around the institute. Faculty should be assigned each student and made responsible for the evaluation and assessment of the training. Formative assessment should be taken from the industry/institute/ department on the basis of performance, behavior and learning capabilities. Summative evaluation may comprise of weight ages on the basis of report submission / presentation followed by viva-voce of the relevant subject.

7. Professional Industrial Training Assessment

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of industrial processes, practices in the industry/field and their ability to engage in activities related to problem-solving in industrial setting as well as understanding of application of learnt knowledge and skills in real life situation. Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, general behavior and it should be followed by viva-voce of the relevant subject.

The formative assessment should include the evaluation from the employer where the student is doing his training in the ratio of 40:60. The final assessment will be the combination of the employer assessment and evaluation by the faculty of the institute which shall include report submission/ presentation/ seminar followed by viva-voce of the relevant subject.

SGPA AND CGPA ASSESSMENT

The UGC recommends the following procedure to compute the Semester Grade Point Average

(SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the marks scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$SGPA\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the ith course and Gi is the marks scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$CGPA = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

29. TEACHING LEARNING TOOLS FOR EFFECTIVE IMPLEMENTATION

For effective implementation of curriculum, the faculty and staff of institutions have to play a vital role in planning instructional experiences for the courses in four different environments viz. class-room, laboratory, library and field and execute them in right perspective. It is emphasized that only a proper mix of different teaching methods in all these places of instruction can bring the changes in students behaviour as stipulated in the curriculum document. It is important to understand curriculum document holistically and further be aware of intricacies of Teaching-Learning Tools for achieving curriculum objectives. Given below are certain recommendations which may help in carrying out teaching-learning effectively:

PROGRAMME LEVEL RECOMMENDATIONS

1. Curriculum implementation takes place at programme, course and class-room level respectively and synchronization among them is required for its success. The first step towards achieving synchronization is to read curriculum document holistically and understand its rationale and philosophy.

2. An academic plan needs to be prepared at institute level. The Head of the institute has a great role to play in its dissemination and percolation up to grass-root level.

3. Heads of Department are required to prepare academic plan at department level referring to institutional academic plan.

COURSE LEVEL RECOMMENDATIONS

Teachers are educational managers at class room level and their success in achieving course level objectives lies in using course plan and their judicious execution which is very important for the success of programme by achieving its objectives. Teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practical's, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practical's and field experiences. Teachers are also required to do all these activities within a stipulated period which is made available to them in the academic plan at Board level. With the amount of time to their credit, it is essential for them to use it judiciously by planning all above activities properly and ensure

execution of the plan effectively. Following is the gist of suggestions for subject teachers for effective utilization of Teaching Learning Tools to achieve the course objectives:

1. Teachers need to ensure attainment of course outcomes so as to help the students achieve program outcomes and also meet the desired learning outcomes in five domains of NSQF i.e. Process, Professional knowledge, Professional skills, Core skills and Responsibility.

2. Teachers are required to prepare a course plan, taking into account number of weeks available and courses to be taught.

3. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of contents to be covered, learning material for execution of a lesson plan.

4. Teachers are required to plan for expert lectures from field/industry. For this, necessary steps need to be taken such as planning in advance, identifying field experts, making correspondence to invite them, taking necessary budgetary approval etc.

5. Teachers are required to plan for guided library exercises by identification of course specific experience requirement, setting time, assessment, etc. The assignments and seminars can be thought of as terminal outcome of library experiences.

6. Concept based industrial/field visits may be planned and executed for such contents of course which are abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

7. Lot of focus needs to be laid on skill development. There is need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning and experiential learning effectively. The development and use of lab manuals will enable the institutes to provide lab experiences effectively.

8. Emphasis should to laid on developing soft skills like communication skills, personality Development, self-learning, inter personal skills, problem solving, and creativity etc.

9. Where ever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time. While teaching, the teacher should make extensive use of audio visual aids such as video films, power point presentations and IT tools.

10. Teachers may take an initiative in establishing liaison with industries and field organizations for imparting field experiences to the students.

11. To enhance digital learning, open electives and multi-disciplinary electives have been provided in the curriculum to be taken up in the form of MOOCs. For Open electives, some courses may be identified out of the prescribed list given in the curriculum keeping in mind the interest of students. Similarly, for multi-disciplinary electives, courses to be offered may be identified by considering their relevance and utility. Every year SWAYAM is notifying the list of courses which are going to be offered in forthcoming even and odd semester. The institute needs to select the courses that are offered on SWAYAM platform or any other online platform.

12. For effective implementation of Massive Open Online Courses (MOOCs), a faculty member in the department may be identified and given the responsibility to coordinate various activities related to MOOCs. The concerned faculty member will facilitate in registration of students for MOOCs. The faculty member will also be responsible for compiling the result of students on the completion of MOOCs and pass on the information to the concerned authority.

13. Flexibility has been provided in the curriculum for the students to choose a course related to the discipline as per their interest. For effective implementation of discipline-specific electives, the institute should identify some courses from the list of courses prescribed in the curriculum. The courses should be selected and offered keeping in mind the interest of students, infrastructure and expertise available in and around the institute related to the courses. Option for discipline-specific elective may be taken from students through a form and a course, with more than 10 students opting for it, may be run.

14. Students should be made aware about issues related to ecology and environment, safety, concern for wastage of energy and other resources etc.

15. Any relevant contents beyond the syllabus may be covered by the teacher or experts in extra time.

16. Minor project should be identified and allocated taking into consideration the inputs from industry stake-holders, and departmental faculty. The minor project work should be such

that it enhances the fundamental skill-sets of the students from industry perspective and subsequently helps them to handle major project.

17. For major project work, students may be given relevant and well thought out problems, which are purposeful and develop practical skills. This will help the students in developing creativity and confidence for their gainful employment.

18. A Project bank may be developed in consultation with related industry, research institutes and other relevant field organizations. It may be ensured that that the students take up some live problems being faced by industry as part of project work.

30. LIST OF EXPERTS AND REVIWERS

1. Mr. Hitesh Kumar, Deputy Secretary, Training & Placement, Haryana State Board of Technical Education, Panchkula.

2. Mr. Sanjeev Kumar, Deputy Secretary, Examination, Haryana State Board of Technical Education, Panchkula.

3. Ms. Nidhi Aggarwal, Deptuy Secretary, Academic, Haryana State Board of Technical Education, Panchkula.

4. Mr. Munish Gupta, HOD, Department of Computer Engineering, Government Polytechnic, Ambala.

5. Mr. Sanjeev Sehgal, HOD, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

6. Mr. Dharamvir Saini, Lecturer, Department of Computer Engineering, Government Polytechnic for Women, Nanakpur.

7. Ms. Poonam Jain, Lecturer, Department of Computer Engineering, Government Polytechnic for Women, Ambala.

8. Mr. Mandeep Singh, Lecturer, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

9. Mr. Kararnbir Singh, Lecturer, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

10. Mr. Rohit Mandhar, Lecturer, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

11. Er. Yogindra Kaushik, Assistant General Manager, Hartron, Gurgaon.

12. Dr. Neeraj Gupta, Associate Professor & Head Curriculum Design Committee, KR Mangalam University, Gurgaon.

13. Mr. Nitin Goel, Ex VP Daffodil Softwares, Repozitory Technologies Pvt. Ltd.,

14. Mr. Ashok Kumar Sangwan, HOD, Cost of Delivery Department, Wipro Limited, Gurgaon.

15. Mr. Mahender Singh, Deputy Secretary (IT), Haryana State Board of Technical Education, Panchkula.

16. Dr. Bhajan Lal, Lecturer, Applied Science Department, Government Polytechnic for Women, Sirsa, Haryana.

17. Sh. Anil Nain, Lecturer, Applied Science Department, Government Polytechnic, Hisar, Haryana.

18. Dr. Sarita Mann, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.

19. Smt. Bindu Verma, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla, Haryana.

20. Smt. Pushpa Rani, Senior Lecturer, Applied Science Department, Government Polytechnic, Sonipat, Haryana.

21. Smt. Krishna Bhoria, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.

22. Smt. Preetpal Kaur, Guest Faculty, Applied Science Department, Government Polytechnic, Ambala, Haryana.

23. Ms. Monika, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla, Haryana.

24. Dr Neena Sharma, English Department, MCM College, Chandigarh.

25. Mr. Satyawan Dhaka, Senior Lecturer, Applied Science Department, Government Polytechnic, Nilokheri.

26. Mrs. Sapna Sang, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.

27. Mr. Ravi Bansal, Lecturer, Applied Science Department, Government Polytechnic, Manesar.

28. Mrs. Kiran, Lecturer, Applied Science Department, Government Polytechnic, Sonepat.

29. Dr. Naveen Jha, Assistant Professor, Department of Mathematics, Government Engineering College, Bharatpur.

30. Dr. Vidhi Grover, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.

31. Mr. Tavinder Singh, Lecturer, Applied Science Department, Government Polytechnic, Sirsa.

32. Ms. Sunita Rani, Lecturer, Applied Science Department, Government Polytechnic, Ambala.

33. Mr. Subhash Chandra Bhoria, Senior Lecturer, Mechanical Engineering Department, Government Polytechnic, Hisar.

34. Mr. Jagjit Singh Narang, Senior Lecturer, Mechanical Engineering Department, Government Polytechnic, Ambala.

35. Mr. Pardeep Kumar, Senior Lecturer, Mechanical Engineering Department, Government Polytechnic, Nilokheri.

36. Mr. KG Srinivasa, Professor, Information Management & Emerging Engineering, NITTTR, Chandigarh.

37. Dr. Pankaj Sharma, Professor, Applied Science Department, NITTTR, Chandigarh.

38. Sh. PK Singla, Associate Professor, Education & Educational Management Department, NITTTR, Chandigarh.

39. Dr. Ashok Kumar, Associate Professor, Applied Science Department, NITTTR, Chandigarh.

40. Dr. KC Lachhwani, Assistant Professor, Applied Science, NITTTR, Chandigarh

41. Dr. Rajesh Mehra, Professor and Head, Curriculum Development Centre, NITTTR, Chandigarh.

42. Dr. AB Gupta, Professor, Curriculum Development Centre, NITTTR, Chandigarh.

43. Dr. SK Gupta, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

44. Dr. Meenakshi Sood, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

Dr. Rajesh Mehra
Programme Coordinator


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