CURRICULUM

FOR

SECOND SEMESTER

OF

THREE-YEAR

DIPLOMA COURSES

IN

POLYTECHNICS

OF

UNION TERRITORY

OF

JAMMU AND KASHMIR

CURRICULUM

FOR

SECOND SEMESTER

DIPLOMA

IN

1. ## ELECTRONICS AND COMMUNICATION ENGINEERING

2. ## MEDICAL ELECTRONICS

SUBJECT STUDY SCHEME (2nd Sem: Electronics and Communication Engineering/Medical Electronics)

Course Code	Subjects	Time in Hours				CREDITS		
		Theory	Tutorial	Practical	Total	Theory	Practical	Total
BS201	Applied Mathematics-II	3	1	--------	4	4	--------	4
ES202	Introduction to Computers and Information Technology	---	---	4	4	----	2	2
EEPC201	Fundamentals of Electrical Engineering	3	1	---	4	4	---	4
EEPC202	Fundamentals of Electrical Engineering Lab	---	---	2	2	---	1	1
ECPC203	Fundamentals of Electronics	3	---	---	3	3	---	3
ECPC204	Fundamentals of Electronics Lab	---	---	2	2	---	1	1
ECPC205	Digital Electronics	3	--------	--------	3	3	--------	3
ECPC206	Digital Electronics Lab	--------	--------	2	2	--------	1	1
ECPC209	Electrical and Electronics Workshop-II	--------	--------	6	6	--------	3	3
	Total	**12**	**2**	**16**	**30**	**14**	**8**	**22**

PROGRAM: THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY *	
Course Code: **BS201**	Course Title: **Applied Mathematics-II**
Semester: **2nd**	Credit: **4**
Periods Per Week: **4 (L: 03, T: 01, P: 0)**	

(* Common to Architecture Assistantship, Automobile, Civil, Civil(PHE), QSCM,Computer , Electrical , E&C,Medical Electronics, Food Technology, I&C,Leather Technology, Mechanical,Textile Technology, Wood Technology and IT)

COURSE OBJECTIVE:

This course is designed to develop an understanding of basic mathematical and statistical tools which include matrices, determinants, integral calculus and coordinate geometry and the applications of such tools in the field of engineering and technology

COURSE CONTENT

1. Integral Calculus

1.1 Integration as inverse operation of differentiation
1.2 Simple integration by substitution, by parts and by partial fractions (for Linear factors only)
1.3 Evaluation of definite integrals (simple problems)-

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)

2. Coordinate Geometry

2.1 Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

2.2 General equation of a circle and its characteristics. To find the equation of a circle, given: Centre and radius, three points lying on it and coordinates of end points of a diameter.

2.3 Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Basic problems on conics when their foci, directrices or vertices are given.

3 Matrices and Determinants

3.1 Definition of matrix and its types.
3.2 Addition, subtraction and multiplication of matrices.
3.3 Expansion of Determinants.

4 Statistics

4.1 Measures of Central Tendency: Mean, Median, Mode
4.2 Measures of Dispersion: Mean deviation, Standard deviation

    4.3   Basic Concepts of Probability.

COURSE OUTCOME

After the completion of the course the student will be able to:

- evaluate both indefinite and definite integrals by various methods
- identify various points in a 2-D space along with formulation of equations and graphs for different types of lines, circles, ellipses, parabolas etc.
- find the sum, difference and product of two or more matrices,
- evaluate determinants and their relations to matrices
- find the mean, median, mode and other measures of central tendency.
- solve basic problems on probability.

RECOMMENDED BOOKS:

1. R.D Sharma, Applied Mathematics-II.

2. H.K Das, Applied Mathematics.

3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.

4. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.

5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.

6. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

7. Applied Mathematics-II, Eagle Publications.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	16	35
2	10	20
3	12	25
4	10	20
Total	**48**	**100**

PROGRAM THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY	
Course Code: **ES202**	Course Title: **Introduction to Computers and Information Technology**
Semester:**2ⁿᵈ**	Credit: **2**
Periods Per Week: **4 (L: 0 T: 0 P: 4)**	

(* Common to Architecture Assistantship, Automobile, Civil, Civil(PHE), QSCM,Computer , Electrical , E&C,Medical Electronics, Food Technology, Garment Technology, I&C,Leather Technology, Mechanical, Textile Design, Textile Technology, Travel and Tourism, MLT, Wood Technology and IT)

COURSE OBJECTIVE

Information technology has great influence on all aspects of our life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. 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 concept of information technology and its scope; operating a computer; use of various tools of MS Office/Open Office using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

COURSE CONTENT

1. **Basics of Information Technology**
   1.1. Its concept and scope, applications of IT, ethics and future with information technology.
   1.2. Impact of computer and IT in society.
   1.3. Computer application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, air and railway ticket reservation, robotics, military, banks, Insurance financial transactions and many more.

2. **Basic Components of Computer System**
   2.1. Block diagram of a computer System and Processing of Data.
   2.2. Demonstration of computer system viz., Hardware, Software
   2.3. Concept of Memory and its various types, Primary and secondary memories (RAM, ROM, Storage Devices etc).

3. **Internet and its Applications**
   3.1. Introduction to Internet, its basic working.
   3.2. Concept of Email, Social Media, Cloud Computing.
   3.3. Basic ideas about IP Address, DNS, URL, Server, Web Browser, LAN etc.

104

4. **Use of Various Basic Data Processing Softwares**
   4.1. ***Word Processing (Microsoft Word & Google Docs.)***
      4.1.1.   File Management:
         4.1.1.1.   Opening, creating and saving a document, locating files, copying contents in some different file(s).
      4.1.2.   Editing a document:
         4.1.2.1.   Entering text, Cut, copy, paste using tool- bars
      4.1.3.   Formatting a document:
         4.1.3.1.   Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
         4.1.3.2.   Aligning of text in a document, justification of document, Inserting bullets and numbering
         4.1.3.3.   Formatting paragraph, inserting page breaks and column breaks, line spacing
         4.1.3.4.   Use of headers, footers: Inserting footnote, end note, use of comments
         4.1.3.5.   Inserting date, time, special symbols, importing graphic images, drawing tools
      4.1.4.   Tables and Borders:
         4.1.4.1.   Creating a table,
         4.1.4.2.   Formatting cells,
         4.1.4.3.   Use of different border styles, shading in tables,
         4.1.4.4.   Merging of cells, partition of cells, inserting and deleting a row in a table
      4.1.5.   Print preview, zoom, page set up, printing options
      4.1.6.   Using Find, Replace options
   4.2. ***Microsoft-Excel and Google Sheets***
      4.2.1.   Introduction to Spreadsheet Application-Workbook and Worksheets
      4.2.2.   Working with data and formulas:
         4.2.2.1.   Addition, subtraction, division, multiplication, percentage and autosum.
         4.2.2.2.   Format data, create chart, printing chart, save worksheet, creating and formatting of charts and graphs
   4.3. ***Presentation (Microsoft-PowerPoint and Google Slides)***
      4.3.1.   Introduction to PowerPoint - How to start PowerPoint - Working environment: concept of toolbars, slide layout, templates etc. - Opening a new/existing presentation - Different views for viewing slides in a presentation: normal, slide sorter etc.
      4.3.2.   Addition, deletion and saving of slides.
      4.3.3.   Insertion of multimedia elements - Adding text boxes, importing pictures, movies and sound, tables and charts etc.
      4.3.4.   Formatting slides - Text formatting, changing slide layout, changing

slide color scheme - Changing background, Applying design template.

4.3.5. Viewing the presentation using slide navigator

COURSE OUTCOME

After the completion of the course the student will be able to:

- Identify the different hardware components and functional units of a Computer system.
- Explain basic concepts and working of internet.
- Create and format word documents by using different word processing software.
- Prepare the spread sheets and the presentation of data in different ways.
- Prepare power point presentations.

RECOMMENDED BOOKS:

1. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd-Jungpura, New Delhi
2. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
3. Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
4. Basics of Information Technology, by Ishan Publications, Ambala
5. Information Technology for Management by Henery Lucas, 7th edition, Tata McGraw Hill Education Pvt Ltd, New Delhi

UNIT WISE TIME AND MARKSDISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	13	20
3	13	20
4	32	50
Total	**64**	**100**

PROGRAM : **THREE YEARS DIPLOMA PROGRAM IN ELECTRONICS AND COMMUNICATION ENGINEERING / MEDICAL ELECTRONICS**			
Course code :**EEPC201**	Course Title: **Fundamentals of Electrical Engineering**		
Semester : **2ND**	Credit : **4**		
Periods per week: **4**	L : 03	T : 01	P: 00

COURSE OBJECTIVE:

     To provide basic knowledge of the different elements and concepts of electrical engineering field and their applications to help students deal with electrical engineering principles and applications in industrial processes of different fields.

CONTENTS

1. BASIC CONCEPTS AND DC CIRCUITS

1.1 Different forms of energy, Advantages & Applications of electrical energy
1.2 Basic concept of charge, current, voltage, resistance, power, energy and their units, Conversion of units of work, power and energy from one form to another
1.3 Active and passive components
1.4 Concept of current and voltage sources, constant voltage and current sources, their graphical representation & Conversion, Difference between actual voltage source and constant voltage source
1.5 Ohm's law, resistances in series and in parallel, Kirchhoff's laws and their applications in solving electrical network problems

2. ELECTROMAGNETISM AND ELECTROMAGNETIC INDUCTION

2.1 Introduction to electromagnetism, Magnetic field around a straight current carrying conductor and a solenoid. Methods to find its direction, force between two parallel current carrying conductors & Force on a current carrying conductor placed in the magnetic field.
2.2 Magnetic circuits, Magnetic flux, mmf, Reluctance, Permeance, comparison between magnetic circuits and electrical circuits, Series and parallel magnetic circuits, simple problems , Importance of Air Gap, Concept of Leakage Flux , B- H Curve ,Magnetic Hysteresis, Hysteresis loss, importance of hysteresis loop.
2.3 Basic concept of electromagnetic induction and Faraday's Laws of electromagnetic induction. Lenz's law, Fleming's Right and Left Hand Rule, Induced EMF and its types , Principle of self and mutually induced EMF, Coefficient of self and mutual induction and simple problems ,Inductances in series and in parallel , Energy stored in a magnetic field ,Concept of eddy currents, eddy current loss

3.   ELECTROSTATICS

3.1   Coulombs law, electric potential and electric potential difference,   Electric field, electric field intensity, electric lines of force, electric flux

3.2   Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, dielectric break down

3.3   Application of electrostatics in electrostatic precipitator

4.   BATTERIES

4.1   Basic idea about primary and secondary cells

4.2   Working principle, construction and applications of Lithium Ion, Lead acid, Nickel Cadmium and Silver Oxide Cells

4.3   Charging methods used for lead acid accumulator / Batteries ,Care and maintenance of a lead acid battery

4.4   Grouping of cells in series and parallel (simple numerical problems).

4.5   Testing of lead Acid battery for fully charged conditions and their specifications.

4.6   Advantages and disadvantages of Lithium Ion Batteries

5.   AC FUNDAMENTALS

5.1   Concept of alternating current and voltage, sinusoidal current and voltage

5.2   Concept of important terms such as Wave form, Instantaneous value ,cycle, Alternation ,Time period , Frequency, peak value , Average Value , Effective value   etc   and equations of instantaneous values, average value, r.m.s value, form factor, power factor etc

5.3   Difference between a.c and d.c and Advantages of AC over DC and vice versa

COURSE OUTCOMES

After the completion of this course, the student will be able to

- explain the basic terminology used in electricity like charge, current, voltage , resistance etc.
- solve basic problems related to Capacitors.
- express electric current as flow of charge.
- solve various electric circuits for current, voltage or resistance.
- list the effects of an electric current and its common applications.
- determine the energy consumed by an appliance.
- state the laws of electromagnetic induction and describe the effect on a current-carrying conductor when placed in a magnetic field.
- explain the concept of batteries , their construction and their applications.
- Describe the various concepts associated with AC and will be also able to distinguish it with DC.

RECOMMENDED BOOKS

1. Fundamentals of Electrical Engineering by Sahdev, Uneek Publication, Jalandhar
2. Basic Electrical Engineering by PS Dhogal, Tata McGraw Hill Education Pvt. Ltd., New Delhi
3. Electrical Science by VK Mehta, S Chand and Co., New Delhi
4. Electrical Engineering by DR Arora, Ishan Publications, Ambala
5. Electrical Technology by JB Gupta, SK Kataria and Sons, New Delhi
6. Electrical Technology by BL Theraja, S Chand & Co., New Delhi
7. Electrical Science by S. Chandhni, R Chakrabarti and PK Chattopadhyay. Narosa Publishing House Pvt. Ltd., New Delhi
8. Basic Electrical Engineering by Mool Singh, Galgotia Publication Pvt. Ltd., New Delhi
9. Principles of Electrical Engineering by BR Gupta, S Chand & Co., New Delhi
10. Handbook of Electrical Engineering by SL Bhatia, Khanna Publishers, New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT	TIME (Hrs)	MARKS (%age)
1	12	25
2	12	25
3	7	15
4	12	25
5	5	10
TOTAL	48	100

PROGRAM : **THREE YEARS DIPLOMA PROGRAM IN ELECTRONICS AND COMMUNICATION ENGINEERING/ MEDICAL ELECTRONICS**	
Course code : **ECPC202**	Course Title: **Fundamentals of Electrical Engineering LAB**
Semester : **2ND**	Credit : **1**
Periods per week : **2**	**L : 0 T : 0 P: 2**

COURSE OBJECTIVE:

To provide basic knowledge of the different elements and concepts of electrical Engineering field and their applications practically to help students deal with electrical engineering principles and applications in industrial processes of different fields.

LIST OF PRACTICALS

1. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions (to verify ohm's law)
2. Filament lamp Measure the resistance of a cold lamp filament with the help of calculations. Measure the current drawn by the lamp at different voltages from zero to 220 volts and the resistance of lamp at different voltages, plot a graph between current and voltage
3. a. Measurement of resistances using multimeter and their comparison with colour code values
   b. To verify that $R_t = R_1 + R_2 + ...$ where R_1, R_2 etc. are resistances connected in series
   c. To verify
$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + ------ + \frac{1}{R_m}$$
   Where R_1, R_2 etc. are resistances connected in parallel
4. Verification of Kirchhoff's current and voltage laws applied to DC circuits
   a. To construct a circuit arrangement consisting of resistances in series, parallel and in combination
   b. Identification of node points in the circuit
   c. To see that algebraic sum of currents at node point is zero
   d. To see that algebraic sum of emfs and voltage drops in a closed loop is zero
5. To observe the a.c and d.c wave shapes on CRO
6. Conversion of Galvanometer into an Ammeter and voltmeter of given range.
7. To measure very low resistance and very high resistance using Wheat Stone bridge
8. To find the time constant of a capacitor
9. Study the charging and discharging characteristics of lead acid and lithium ion batteries.
10. Study the charging and discharging characteristics of battery management system.
11. To find ratio of inductance values of a coil having air /iron core respectively and to see the effect of introduction of a magnetic core on coil inductance

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN 1.ELECTRONICS AND COMMUNICATION ENGINEERING 2. MEDICAL ELECTRONICS	
Course Code: **ECPC203**	Course Title: **Fundamentals of Electronics**
Semester: **2ⁿᵈ**	Credits: **3**
Periods Per Week :**3 (L: 3, T:0, P: 0)**	

COURSE OBJECTIVES: The course aims at introducing the basic concept of electronics which forms the building block of the world of electronics, communication, computer and information technologies.

CONTENTS

1. Semi conductor physics   (08 hrs)

    1.1 Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors and their energy level diagram, atomic structure of Germanium (Ge) and Silicon (Si) and their formation of covalent bonds.
    1.2 Concept of intrinsic and extrinsic semi conductor,Majority and minority carriers, process of doping.
    1.3 P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semi conductors.

2. Semi conductor diode: (08 hrs)

    2.1 PN junction diode, mechanism of current flow in PN junction, forward and reverse biased PN junction, potential barrier, drift and diffusion currents, depletion layer, concept of junction capacitance in forward and reverse biased condition.
    2.2 V-I characteristics, static and dynamic resistance of a diode and their value calculation from the characteristics.
    2.3 Application of diode as half-wave, full wave and bridge rectifiers. Peak Inverse Voltage(PIV) rating, rectification efficiencies and ripple factor , shunt capacitor filter, series inductor filter, LC and Pie filter.

3. Special diodes   (04 Hrs)

    3.1 Zener diodes and its working, Zener and avalanche breakdown.
    3.2 Application of Zener Diode as voltage Regulator
    3.3 Introduction to Photo diode ,LED,Schottkey diode, varactor diode, PIN diode.

4.   Bipolar-transistors: (10 hrs)

    4.1   Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols and mechanism of current flow; Current relations in a transistor; concept of leakage current

    4.2   CB, CE, CC configurations of a transistor; Input and output characteristics in CB ,CE,CC configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors. Comparison of CB, CE and CC Configurations

5.   Transistor Biasing Circuits   (06hrs)

    5.1   Concept of transistor biasing and selection of operating point.

    5.2   Need for stabilization of operating point.

    5.3   Different types of biasing circuits.

6. Unipolar Transistors   (06 hrs)

    6.1 Construction, operation and characteristics of MOSFET/JFET and their applications.

    6.2 Brief introduction of CMOS and its application.

7. Single stage transistor amplifier: (06 hrs)

    7.1 Single stage transistor amplifier circuit.

    7.2 Explanation of phase reversal of output voltage with respect to input voltage.

COURSE OUTCOMES

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

- Identify and able to understand physics behind various types of materials.
- Describe the VI characteristics of PN junction diode and Zener diode.
- Fabricate half wave, full wave and bridge rectifier and observe waveforms of each
- Draw input and output characteristics of transistor in CB and CE mode
- Measure voltage gain, input and output impedance in a single state CE amplifier circuit.
- Analyze the characteristics of FET and MOSFET.

RECOMMENDED BOOKS

1. Kulshreshta and SC Gupta, "Basic Electronics and Linear Circuit" byTata McGraw Hill Education Pvt Ltd., New Delhi.
2. VK Mehta, "Principles of Electrical and Electronics Engineering" by S Chand and Co., New Delhi
3. Robert Boylestad,LouisNashelsky,"Electronic Devices and Circuit Theory",Pearson Education.
4. Albert Paul Malvino, "Principles of Electronics" by Tata McGraw Hill Education Pvt Ltd., New Delhi.
5. Albert Malvino and David J. Bates, "Basic Electronics – Problems and Solutions" by Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.
6. J.S. Katre, Sandeep Bajaj, "Basic Electronics" by Tech. Max. Publications, Pune.
7. SK Sahdev, "Electronic Principles" by Dhanpat Rai& Co., New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Sr No	Unit Name	Time Allotted (Hrs)	Marks Allotted (%)
1.	Semiconductor Physics	08	20
2.	Semiconductor Diode	08	20
3	Special Diodes	04	10
4.	Bipolar Transistors	10	20
5.	Transistor biasing circuits	06	10
6.	Unipolar Transistors	06	10
7.	Sigle stage amplifiers	06	10
	Total	**48**	**100**

PROGRAM: **THREE YEARS DIPLOMA PROGRAMME IN** **1.ELECTRONICS AND COMMUNICATION ENGINEERING** **2. MEDICAL ELECTRONICS**	
Course Code**: ECPC204**	Course Title**: Fundamentals of Electronics Lab**
Semester: **2ⁿᵈ**	Credits**: 1**
Periods Per Week **:2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVES:

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

LIST OF PRACTICALS

1. Plotting of V-I characteristics of a PN junction diode
2. Plotting of V-I characteristics of a Zener diode
3. Fabrication of Half-wave rectifier circuit on breadboard and observe the output
4. Fabrication of Full-wave rectifier circuit on breadboard and observe the output
5. Plotting of the wave shape of full wave rectifier with
   a. Shunt capacitor filter
   b. Series inductor filter
6. Plotting of input and output characteristics and calculation of parameters of transistors in CE configuration.
7. Plotting of input and output characteristics and calculation of parameters of transistors in CB configuration.
8. Measurement of voltage gain, input and output impedance in a single stage CE amplifier circuit.
9. Plotting of V-I characteristics of JFET.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN 1. ELECTRONICS AND COMMUNICATION ENGINEERING 2. MEDICAL ELECTRONICS	
Course Code: ECPC205	Course Title: DIGITAL ELECTRONICS
Semester: 2nd	Credits: 3
Periods Per Week :3 (L: 3, T:0, P: 0)	

COURSE OBJECTIVE: The course aims at introducing the concept of Digital Electronics which forms the foundation to the digital world of today's era. This subject aims to give a background in the broad field of digital systems design and microprocessors.

COURSE CONTENT
1. Introduction
   a) Comparison between analog and digital signal.
   b) Applications and advantages of digital signals

2. Number System and Codes

   a) Binary, octal and hexadecimal number system: conversion from Octal, Decimal and hexadecimal to binary and vice-versa.
   b) Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction
   c) Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.

3. Logic Gates
   a) Concept of negative and positive logic
   b) Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.
4. Logic Simplification
   a) Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equation with gates
   b) Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits
5. Arithmetic circuits
   a) Half adder and Full adder circuit, design and implementation.
   b) Half and Full subtractor circuit, design and implementation.
   c) 4 bit adder/subtracter.
   d) Adder and Subtractor IC (7484)
6. Encoders and Decoders, Multiplexer and De-Multiplexers
   a) Encoders and decoders – their types and block/circuit diagram explanation of each type.
   b) Multiplexers and De-Multiplexers- their types and block/circuit diagram explanation of each type
   c) Different types and ICs.

115

7. Latches and flip flops
    a) Concept and types of latch with their working and applications
    b) Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops.
    c) Difference between a latch and a flip flop
    d) Flip flop ICs
8. Counters
    a) Introduction to Asynchronous and Synchronous counters
    b) Decade counter.
    c) Up/down counter
    d) Counter ICs
9. Introduction to Shift Registers

COURSE OUTCOME

After completion of the course the student will be able to
- understand the fundamental concepts of Digital Electronics
- derive basic logic gates and universal gates and illustrate realization of Boolean expression
- design adder and subtractor circuits using logic gates
- design and test combinational and sequential logic circuits

RECOMMENDEDBOOKS.

1. Digital Electronics by Thomas Floyd.
2. Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
4. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Digital Electronics by KS Jamwal, DhanpatRai and Co., New Delhi
6. Digital Electronics by BR Gupta, DhanpatRai& Co., New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Topic	Time (hrs)	Marks (%age)
1.	Introduction	02	05
2.	Number System & Codes	05	10
3	Logic Gates	05	10
4	Logic Simplification	07	15
5	Arithmetic Circuits	08	20
6	Encoders and Decoders, Multiplexers and Demultiplexers	08	15
7	Latches and Flip flops	05	10
8	Counters	05	10
9	Introduction to Shift Registers	03	05
	Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN 1.ELECTRONICS AND COMMUNICATION ENGINEERING 2. MEDICAL ELECTRONICS	
Course Code: **ECPC206**	Course Title: **DIGITAL ELECTRONICS LAB**
Semester: **2ⁿᵈ**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

This course is a lab course related to the theory subject of Digital Electronics.

LIST OF PRACTICALS

1. Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates
2. Realization of logic functions with the help of NAND or NOR gates

3. To design a half adder using XOR and NAND gates and verification of its operation & Construction of a full adder circuit using XOR and NAND gates and verify its operation
4. 4 bit adder, 2's complement subtractor circuit using an 4 bit adder IC and an XOR IC and verify the operation of the circuit.
5. To design a NOR Gate Latch and verification of its operation
6. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, JK flip-flops).
7. Verification of truth table for encoder and decoder ICs, Mux and DeMux ICs.

8. To design a decade counter and verify its operation.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN 1.ELECTRONICS AND COMMUNICATION ENGINEERING 2. MEDICAL ELECTRONICS	
COURSE CODE: **ECPC209**	COURSE TITLE: **ELECTRICAL AND ELECTRONIC WORKSHOP - II**
SEMESTER: **2ND**	CREDITS: **3**
PERIODS PER WEEK :**6 (L: 0, T:0, P: 6)**	

COURSE OBJECTIVE:

The students will be required to inspect, test and modify the work done by skilled workers working under him. In addition, many a times, it will become necessary for them to demonstrate the correct method and procedure of doing a job. In order to carry out this function effectively in addition to conceptual understanding of the method or procedure he must possess appropriate manual skills. The subject aims at developing special skills required for repairing, fault finding, wiring in electrical appliances and installations and besides working at the lower levels like PCB/breadboards etc.

COURSE CONTENTS

1. **Electric Shop – II**
   1.1. Estimating and costing of power connection.
      1.1.1. **Job I**: Connecting single-phase energy meter and testing it.
      1.1.2. **Job II**: Checking continuity of connection (with tester and series lamp) location of faults with a multimeter) and their rectification in simple machines and/or other electric circuits fitted with earthing.
   1.2. Demonstration of dismantling, servicing and reassembling
      1.2.1. **Job III**: a table fan/ceiling fan
      1.2.2. Job IV: electric iron, Electric heater etc.
   1.3. Testing
      1.3.1. **Job V**: Testing Single phase/three phase electrical motor by using voltmeters, ammeter, clip on meter, tachometer etc.
      1.3.2. **Job VI**: Reversing the rotation of a motor.

2. **Electronic Shop- II**
   2.1. PCB soldering/ De-soldering Techniques
      2.1.1. **Job VII**: Demonstrate the jointing methods on general purpose PCB boards mounting and dismantling of various components
   2.2. Application and Use of Measuring and Test Equipment
      2.2.1. **Job VIII:** Identification of active and passive components. Use of Multimeter in testing of active and passive components.
      2.2.2. **Job IX**: Single beam simple CRO, Single Generator and function-Generator, function of energy knob on the front panel.
      2.2.3. **Job X:**   Regulated power supply-fixed and variable voltage, single output as   well as dual output.
   2.3. Identification and familiarization with active and passive components

2.3.1. **Job XI:** Color code and types of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor).   Identification of components including LED, LCD, UJT, FET, Coils, relays, read relays, transformers, Linear and Digital   ICs, Thyristors, etc.   Exposure to modern soldering   and de-soldering processes

2.4. Field visits to relevant work-places