J. S. UNIVERSITY, SHIKOHABAD

DIPLOMA

2nd Semester

(Electrical Engineering)

SCHEME & SYLLABUS

[Effective from the session 2015-16]

STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN

ELECTRICAL ENGG.

SEMESTER - Second

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DAS-22	Applied Mathematics-II	4	1	-	-	20	50	70	2.5
2	DAS-23	Applied Physics-II	4	1	-	-	20	50	70	2.5
3	DEE-21	Basic Electrical Engg	4	1	-	-	20	50	70	2.5
4	DEC-21	Electronics - I	4	1	-	-	20	50	70	2.5
5	DDW-21	Engineering Drawing	-	-	-	8	20	50	70	3
PRACTICA/DRAWING SUBJECTS										
6	DAS-23P	Applied Physics-II Lab	-	-		-	20	40	60	3
7	DEE-21P	Basic Electrical Engg Lab	-	-	4	-	20	40	60	3
8	DEC-21P	Electronics – I Lab	-	-	4	-	30	60	90	3
Games//Social and Cultural Activities + Discipline (15 + 10)									25	
Grand Total									585	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

DAS-22 Mathematics - II

Unit -1: Integral Calculus-I

Methods of finding indefinite integral
1. Integration by substitution
2. Integration by parts
3. Integration by partial fraction
4. Integration of special functions

Unit-2: Integral Calculus-II

1.Definite integral: definition and properties, Evaluation of integrals

2. Applications of definite integrals: Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution,

3.Numerical Integration: Trapezoidal rule, Simpson`s 1/3rd rule and Simpson`s 3/8 th rule

Unit-3: Coordinate Geometry-I

1.Circle : Equation of circle in standard form, centre –radius form , diameter form and two intercept form.
2. Standard form of curves and their simple properties:
Parabola
Ellipse
Hyperbola

Unit-4: Coordinate Geometry-II

1.Distance between two points in space , direction cosines and direction ratios, Finding equation of a straight line and shortest distance between two lines.
2. Sphere

[DAS-23] Applied Physics-II

1. Optics

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Deotructive), Diffraction and Polarization (Concept Only), Law of Mallus and Polaroids.

2. Introduction To Fibre Optics :

Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications

Absorbtion and Emission of energy by atom, Spontaneous and Stimulated Emission, Poluation inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :

Coutomb's Law, Electric field, Electric potential, Potentialenergy, Capacator, Energy of a charged capacitor, Effect of dielectric on capacators.

5. D.C. Circuits

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties:

Dia, Para and Ferro-magnetism, Ferrites, Magnatic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics

Concept of Energy bands in soldis, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semiconductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister :

Majority and Minority charge carriers,P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics :

Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT,OR).

10. Non-conventional energy sources:

(a) Wind energy : Introduction, scope and significance, measurement of wind velocty by anemometer, general principle of wind mill.

(b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

[DAS-23P] Applied Physics-II

Note: Any 5 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T2 verses l and using the formula g=4n2/Slope of the graph line
3. Determine the force connstant of combinationof springs incase of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E1/E2 of cells by potentio meter.
8. Determination of specific resistance by Carry Foster bridge.
9. Determination of resitivity by P.O.Box.
10. Verification of Kirchoff's Law.
11. To draw Characteristics of p-n Junction diode.

[DEE-21] Basic Electrical Engg

1. Basic Terminology and their concepts

1.1 Current, EMF, potential difference (Voltage), resistance, resistivity their units conductors & insulators, Insulation resistance of a cable.

1.2 Effect of temperature on the resistance of conductors, semiconductors (C, Si, Ge) and insulators.

1.3 Electrical power, energy and their units (SI), Heating effect of electric current and its practical examples.

1.4 Relationship between electrical, mechanical and thermal SI units of work, power and energy.

2. D.C. Circuits

2.1 Kirchoff's laws.

2.2 Simple numerical problems based on Kirchoff's laws.

2.3 Introduction to Thevenin and Superposition theorem, Norton's theorem

3. Batteries

3.1 Construction, chemical changes during charging and discharging of lead acid cells.

3.1(a) Indications of a fully charged battery.

3.2 Capacity and efficiency of lead acid cell / battery.

3.3 Charging of 6 V., 12 V. commercial batteries. 3.3(a) Grouping of cells.

3.4 Care and maintenance of commercial batteries.

3.5 Problems/defects in lead acid betteries.

3.6 Concept of Nickel-Iron and Nickel Cadmimum Batteries.

3.7 Concept of solid sealed maintenance free batteries (SMF batteries), Oxygen recombiniation principle. 4. Capacitors

4.1 Concept of capacitor, types of capacity of parallel plate capacitor, Composite capacitor and effect of physical parameters.

4.1 Energy stored in a capacitor, dielectric and its influence on capaitance of a capacitor, dielectric constant dielectric breakdown and dielectric strength. Dielectric loss.

4.3 Series and parallel combination of capacitors.

4.3(a) Capacitance of multi-plate capacitors.

4.4 Variable capacitors.

4.5 Charging and discharging of capacitors.

4.6 Simple problems on capacitors. 5. Electromagnetism

5.1 Concept of magnetic flux, flux density, magnetic field intensity ,permeability and their units.

5.2 Magnetic circuits, concept of reluctance and mmf and simple problems.

5.3 Analogy between electric and magnetic circuits.

5.4 B-H curve and magnetic hysteresis (No mathematical derivation).

5.5 Elementary ideas about hysteresis loss.

5.5(a) Lifting powers of a magnet.

6. Electromagnetic Induction

6.1 Faraday's laws of electromagnetic induction. Lenz's law, simple problem. Dynamically induced emf.

6.2 Self induced emf, inductance, its role in electrical circuits. Simple problems.

6.3 Mutually induced emf, mutual inductance,its role in electrical circuits. Simple problems.

6.4 Energy stored in magnetic circuit.

6.5 Rise and decay of current in inductors.

6.6 Force on a current carrying conductor placed in a magnetic field and its applications.

6.7 Elementary idea about eddy current loss.

7. A.C.Circuits

7.1 Recapitulation of terminology, instantaneous value, maximum (peak) value, cycle, frequency, alternate current and voltage. Difference between AC and DC.

7.2 Equation of an alternating voltage and current and wave shape varying sinusoidally.

7.3 Average and RMS value of alternating voltage and current. Importance of RMS value. Simple problems.

7.4 Concept of phase, phase difference and phasor representation of alternating voltage and current.

7.5. A.C. through pure resistance, inductance,capacitance, phasor diagram and power absorbed.

7.6 R-L series circuit, idea of impedance and calculations.

7.7 Apparent power, reactive power and active power,power factor, its importance and simple problems.

7.8 R-C series circuit , simple problems.

7.9 R-L-C series circuit , simple problems.

7.10 Solution of simple parallel A-C ciruits by
(a) Phasor diagram method,
(b) Admittance method.
7.11 Solution of AC circuits series/parallel by j method.
7.12 Resonance (Series and parallel) and practical application, simple problems. 8. Polyphase System
8.1 Introduction to polyphase system. Advantage of three phase system over single phase system.
8.2 Star and Delta connections. Relationship between phase and line value of currents and voltage.Power in polyphase circuits. Simple problems of balanced circuits only.

[DEE-21P] BASIC ELECTRICAL ENGG. LAB

i) To show the variation of resistance of a lamp with temperature by plotting a V-I curve for 60W and 100W filament lamps.
ii) To verify the Kirchoff's laws.
iii) To observe the B-H curve for a ferro-magnetic core on CRO.
iv) To find the relationship between voltage and current for R-L series circuit for variable resistances & variable inductance.
v) To determine the variation in the values of inductance of a coil for different positions of the movable iron core.
vi) To measure the power factor in a single phase AC circuit by using voltameter, ammeter & wattmeter.
vii) To test a battery for charged and discharged condition and to charge a battery.
viii) Verification of voltage and current relations in Star and delta connected systems.
ix) To cahrge and discharge a capacitor and to show the graph on C.R.O.
x) Verification of laws of capacitors in series and parallel.

[DEC-21] Electronics – I

1. Semiconductor Diodes

Semiconductor materials N type and P Type P.N. junction, its forward and reversed biasing; junction diode characteristics. Diode (P-N junction) as , half wave, full wave rectifier including bridge rectifier, relationship between D.C. output voltage and A.C. input voltage, rectification efficiency and ripple factor for rectifier circuits, filter circuits, shunt capacitor, series inductor, capacitor input filter. Different types of diodes, brief idea of characteristics and typical applications of power diodes, zener diodes, varactor diodes, point contact diode, tunnel diodes, LEDs and photodiodes. Important specifications of rectifier diode and zener diode.

2. Bipolar Junction Transistor :

Concept of bipolar junction transistor, PNP and NPN transistor,s their symbols and mechanisms of current flow, explanation fundamental current relations. Concept of leakage current (I cbo) effect of temperature on leakage current. Standard notation for current and voltage polarity; CB, CE, and CC configurations. Transistor input and output characterstics, concept of active, cut off and saturation region. Common emitter configuration: current relations in CE configuration, collector current in terms of base current and leakage current (Iceo), relationship between the leakage current in CB and CE configuration, ;input and output characteristics, determination of dynamic input and output resistances and current amplification factor from the characteristics.

3. Single Stage Transistor Amplifier

Single stage CE amplifier with proper biasing circuit and its working as voltage amplifier. AC load line and its use in:

(a) Explanation of phase reversal of the output voltage with respect to input voltage. Introduction to tuned voltage amplifier.

4. FIELD EFFECT TRANSISTOR (FET), MOSFET & CMOS A. FET :

- Construction, operation, characteristics and Biasing of Junction FET.
- Analysis of Single stage CB, CG and CD amplifier.

B. MOSFET :

- Construction, operation, characteristics and Biasing of MOSFET in both depletion and enhancement modes.
- Analysis of Single stage CB, CG and CD amplifier.

C. CMOS :

- Construction, operation, characteristics of CMOS in in both depletion and enhancement modes.
- Use of CMOS as Invertor, Different Application of CMOS, CMOS IC.
- Comparison of JEET, MOSFET and Bipolar transistor.

5. MULTISTAGE & POWER AMPLIFIERS:

5.1 Need of multistage amplifier, different coupling schemes and their working, brief mention of application of each of the type of coupling.

5.2 Working of R.C. coupled and transformer coupled multistage amplifier, approximate calculation of voltage gain and frequency response for a two stage R-C coupled amplifier. Working principles of push pull amplifier circuits its advantages over single ended power amplifer.

6. Feedback in Amplifiers

Basic principles and types of feedback, derivation of expression for the gain of an amplifier employing feedback. Effect of negative feedback on gain,. stability, distortion, and band width.(only physical explanation) typical feedback circuits:

(a) RC coupled amplifiers with emitter by-pass capacitor removed.

(b) Emitter follower, complementary symmetry power amplifier and its applications.

7. Regulated Power Supply

7.1 Concept of regulation.

7.2 Basic regulator circuits (using zener diode).

7.3 Concept of series and shunt regulator circuits.

7.4 Three terminal voltage regulator Ics (positive negative and variable) application. Block diagram, Pin configuration and working of popular regulator IC.

8. OSCILLATORS:

8.1 Application of oscillators.

8.2 Use of positive feedback/negative resistance for generationof oscillation, barkhawn's criterion for oscillations.

[DEC-21P] ELECTRONICS I LAB

1. Semiconductor diode : identification of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (germaniun, point contact, silicon low power and high power and switching diode).
2. Rectifier circuits using semiconductor diode measurement of input and output voltage and plotting of input and output wave shapes:
i) Half wave rectifier
ii) Full wave rectifier (centre tapped and bridge rectifier circuits).
3. Plot the wave shapes of a full wave rectifier with shunt capacitor, series inductor, and filter circuit
4. Single stage common emitter amplifier circuit
i) Measurement of voltage gain at 1 KHZ for differnet load resistances.
ii) Plotting of frequency response of a single stage amplifier circuit.
iii) Measurement of input and output impedance of the amplifier circuit.
5. To measure the overall gain of two stage R.C coupled amplifier at 1 KHZ and note the effect of loading of second stage on the first stage.
6.(a)To plot the laod Vs output power characterstic to determine the maximum signal input for undistorted signal output.
(b) The above experiment is to be performed with single ended power amplifier, transistorized push pull amplifier. Complementary symetry power amplifier.
7. To observe the effect of a bye-pass capacitor by measuring voltage gain and plotting frequency response for a single stage amplifier.
8. To measure input and output impedance of a feedback amplifier with and without by-pass capacitor.
9. Measurement of voltage gain, input and output impedance and plotting of frequency response of an emitter follower circuit.
10. Plot the FET characteristics and determination of its parameters from these characteristics.
11. To test adjustable IC regulator and current regulator.
12. Identification of Some Popular IC of 74 and 40 series with Pin Number and other details.
13. Application and use of Multimeter, CRO, Audio Oscillator and Power Supply (D.C.)

[DDW-21] ENGINEERING DRAWING

1. Drawing, instruments and their uses.

1.1 Introduction to various drawing, instruments.

1.2 Correct use and care of Instruments.

1.3 Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques 1 Sheet

Printing of vertical and inclined, normal single stroke capital letters. Printing of vertical and inclined normal single stroke numbers. Stencils and their use.

(b) Introduction to Scales 2 Sheet

Necessity and use, R F Types of scales used in general engineering drawing.Plane, diagonal and chord

scales. 3. Conventional Presentation: 2 Sheet

Types of lines, Conventional representation of materials, Thread (Internal and External), Conventional representation of machine parts,Welded joint.

4. (a) Principles of Projection 1 Sheet

Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. Dimensconing techniques.

(b) Projections of points, lines and planes. 2 Sheet

5 (a) Orthographic Projections of Simple Geometrical Solids 3 Sheet

Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with reference planes.

(b) Orthographic views of simple composite solids from their isometric views.

(c) Exercises on missing surfaces and views

6. Section of Solids 2 Sheet

Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclined to the others plane,

true shape of the section

7. Isometric Projection. 1 Sheet

Isometric scale Isometric projection of solids.

8. Free hand sketching 1 Sheet

Use of squared paper Orthographic views of simple solids Isometric views of simple job like carpentry

joints 9. Development of Surfaces 2 Sheet

Parallel line and radial line methods of developments. Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: 3 Sheet

Nut and Bolt, Locking device, Bush Bearing

11. PRACTICE ON AUTO CAD : 2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

NOTE :

A. The drawing should include dimension with tolerance wherever necessary, material list according to I.S. code.

25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure

B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.