J. S. UNIVERSITY, SHIKOHABAD

DIPLOMA

3rd Semester

(Electrical Engineering)

SCHEME & SYLLABUS

[Effective from the session 2015-16]

STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN

ELECTRICAL ENGG.

SEMESTER - THIRD

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-31	Applied Mathematics-III	4	1	-	-	20	50	70	2.5
2	DEE-31	Electrical Instruments & Measurements	4	1	-	-	20	50	70	2.5
3	DMC-31	Elementary Mechanical & Civil Engineering.	4	1	-	-	20	50	70	2.5
4	DEE-32	Electrical M/c-I	4	1	-	-	20	50	70	2.5
PRACTICA/DRAWING SUBJECTS										
5	DCS-31P	Computer Application For Engg.	-	-	10	-	30	60	90	3
6	DEE-31P	Electrical Instruments & Measurements Lab	-	-	4	-	20	40	60	3
7	DMC-31P	Elementary Mechanical & Civil Engineering Lab	-	-	4	-	20	40	60	3
8	DEE-32P	Electrical M/c-I Lab	-	-	4	-	20	40	60	3
9	DGD-30	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
								Grand Total	575	

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-31APPLIED MATHEMATICS III

1. MATRICES :

1.1 Algebra of Matrices, Inverse :Addition, Multiplication of matrices, Null matrix and a unitmatrix, Square matrix, Symmetric, Skew symmetric, Hermitian,Skew hermition, Orthagonal, Unitary, diagonal and Triangularmatrix, Determinant of a matrix.Definition and Computation of inverse of a matrix.

1.2 Elementry Row/Column Transformation :Meaning and use in computing inverse and rank of a matrix.

1.3 Linear Dependence, Rank of a Matrix :Linear dependence/independence of vectors, Definition andcomputation of a rank of matrix. Computing rank throughdeterminants, Elementary row transformation and through theconcept of a set of independent vectors,Consistency ofequations.

1.4 Eigen Pairs, Cayley-Hamilton Theorem : Definition and evaluation of eign values and eign vectors ofa matrix of order two and three, Cayley-Hamilton theorem(without Proof) and its verification, Use in finding inverseand powers of a matrix.

2. DIFFERENTIAL CALCULUS :

2.1 Function of two variables, identification of surfaces inspace, conicoids

2.2 Partial Differentiation :Directional derivative, Gradient, Use of gradient f, Partialderivatives, Chain rule, Higher order derivatives, Eulenstheorem for homogeneous functions, Jacobians.

2.3 Vector Calculus :Vector function, Introduction to double and triple integral,differentiation and integration of vector functions,gradient, divergence and curl, differential derivatives.

3. DIFFERENTIAL EQUATION :

3.1 Formation, Order, Degree, Types, Solution :Formation of differential equations through physical,geometrical, mechanical and electrical considerations,Order, Degree of a differential equation, Linear, Nonlinearequation.

3.2 First Order Equations :Variable seperable, equations reducible to seperable forms,Homogeneous equtions, equtions reducible to homogeneousforms, Linear and Bernoulli form exact equation and theirsolutions.

3.3 Higher Order Linear Equation :Property of solution, Linear differential equation withconstant coefficients (PI for X=eax, Sin ax, Cos ax, Xn,eaxV, XV.

3.4 Simple Applications :LCR circuit, Motion under gravity, Newton's law of cooling,radioactive decay, Population growth, Force vibration ofa mass point attached to spring with and without dampingeffect. Equivalence of electrical and mechanical system

4. INTEGRAL CALCULUS - II:

4.1 Beta and Gamma Functions :Definition, Use, Relation between the two, their use inevaluating integrals.

4.2 Fourier Series :Fourier series of f(x),-n<x<n, Odd and even function,Halfrange series.

4.3 Laplace Transform :Definition, Basic theorem and properties, Unit step andPeriodic functions, inverse laplace transform, Solution ofordinary differential equations.

5. PROBABILITY AND STATISTICS :

5.1 Probability :Introduction, Addition and Multiplication theorem and simpleproblem.

5.2 Distribution :Discrete and continuous distribution, Bionimal Distribution,Poisson Distribution, Normal Distribution..

[DEE-31] ELECTRICAL INSTRUMENTS AND MEASUREMENTS

1 Introduction to electrical measuring instruments:

1.1 Concept of measurement and instruments.

1.2 Electrical quantities and instruments for theirmeasurements.

2.1 Measurement and Errors. Accuracy, precision, typesof errors, probability of errors and Gaussian Errorscurve, sensitivity, resolution andstability. Classification of errors.

2.2 Types of electrical measuring instruments, indicating,integrating and recording instruments.

2.3 Essentials of indicating instruments , deflecting,controlling and damping torques.

3. Ammeters and voltmeters (moving coil and movingiron type)

3.1 Concept of ammeters and voltmeters and differencebetween them.

3.2 Construction and working principle of moving coil andmoving iron instruments. Merits and demerits.

3.3 Extension of range, use of C.T. & P.T.

4. Wattmeters (Dynamometer type) and Maximum DemandIndicator:

4.1 Construction, working principle, merits and demeritsof dynamometer type wattmeter.

4.2 Power measurement in three phase circuit by Twowattmeter and three wattmeter methods, simple problems.

4.4 Construction and working principle of maximum demandindicators.

5. Energymeter (Induction type):

5.1 Construction, working principle, merits and demeritsof single-phase and three phase energy meters.
5.2 Testing of energy meters for calibration. Errors andcompensation. Simple problems.
5.3 Digital Energy meter (Single Phase/Three Phase)Construction working and application
5.4 Trivector Meter, Construction, Working & ItsApplication.
6. Miscellaneous Measuring Instruments:The construction, working principle and applicationof: ohm-meter, meggar, earth tester,multimeter, frequency meter (reed-type) single phasepower factor meter (Electrodynamometer type), 3-phasepower factor meter, phase sequence indicator,synchronoscope.
7. Electronic Instruments:
7.1 Cathode Ray Oscilloscope, construction, working ofCRO. Simple applications (likemeasurement of voltage current and frequency).
7.2 Introduction to electronic multimeter, analogmultimeter , digital multimeters and V.T.V.M.
8. Measurement of Resistance Inductance and Capacitance
8.1 Bridges : Maxwell bridge, Wein's bridge and Scheringbridge.
8.2 Potentiometer, Kelvin's double bridge.
9. Elements of Process Instrumentation
9.1 Block diagram of process instrumentation system andpurpose of each block.
9.2 Basic principles of various sensors/transducers formeasurement of temperature, pressure, strain andliquid level.

[DEE-31P] ELECTRICAL INSTRUMENTS AND MEASUREMENT LAB

(i) To extend the range of an ammeter/voltmeter.
(ii) To convert an ammeter into voltmeter.
(iii) To calibrate 1-phase energymeter by direct loadingmethod.
iv) To make proper connections of indicating/integratinginstruments in a circuit e.g. wattmeter, frequencymeter, power factor meter, 1-phase and 3-phase energymeter (Analog type/Digital Type) etc.
(v) To measure power, power factor in a l-phase circuitusing wattmeter and power factor meter and verifyresults with calculations.
(vi) Measurement of power and power factor of a 3-phasebalanced load by 2-wattmeter method.
(vii) Measurement of voltage, frequency of a sinusoidalsignal with C.R.O.
(viii) Measurement of resistance, voltage, current withelectronic multimeters (Analog & Digital) and comparethe reading.
(ix) To measure strain by transducer.
(x) To measure inductance by maxwell's bridge.
(xi) To measure capacitance by Wein's/Schering bridge.
(xii) To calibrate three phase energy meter with the help ofstandard 3 phase energy meter.
(xiii) To connect a Trivector meter in a three phase circuitand make measurement of different quantities.

[DCS-31P] COMPUTER APLICATION FOR ENGINEERING LAB

1. Introduction to Computer:Block Diagram of Computer, Types Of Computer CentralProcessing unit (Control unit, A.L.U.) & memoryUnit. Types of Input and Output devices and memories.Visual Display Unit, Keyboard, Floppy disk drive, Hard diskdrive, CD-ROM Drive, Magnetic & Tape DriveNumber system(Conversion) Binary, Octal, Hexa decimalnumber system,Conversion from Decimal to Other System andvice-versa Bit, Byte and Word.
2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)What is operating system, its significance, Commands of DOS,Features/Application of window.
3. MS WORD:File : Open, Close, Save, Save as, Search, Send to, PrintPreview, Print and Page SetupEdit : Cut, Copy,Paste, Office Clipboard, Select All,Find, replace, Goto, etc.View : Normal/Web Layout/Print Layout; Tool Bars;Header/Footer; Zoom, etc.Insert: Break, Page Number, Date & Time, Symbol, Comment,Reference, etc.Format: Font, Paragraph, Bullets & Numbering, Borders &Shading, Column, Change case, Back ground, etc.Tools : Spelling &Grammer, Language, Word Count, Letters &Mailing, Options, Customize, etc.Table : Draw, Insert, Delete, Select, Auto Format, AutoFit,Convert, Sort, Formula, etc.
4. MS EXCEL:Introduction, Use of Tools/Icons for preparing simpleapplications.
5. MS POWER POINT :Introduction, Use of Tools/Icons for preparing simplepresentation on Power Point.

6. MS ACCESS :Introduction, Use of Tools/Icons for preparing simpleapplications.
7. Introduction to Internet:What is Network, How to send & receive messages, Use ofSearch Engines, Surfing different web sites. Creating MailID, Use of Briefcase, Sending./replying emails.
8. Concept of Programming :Flowcharting, Algorithm techniques, etc.

List OfPracticals

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/Report) on MS Word and taking its print out.
3. Creating, editing, modifying tables in MS ACCESS.
4. Creating labels, report, generation of simple forms in MS-ACCESS.
5. Creating simple spread sheet, using in built functions in MS-EXCELL.
6. Creating simple presentation on Power Point.
7. Creating mail ID, Checking mail box, sending/replying emails.
8. Surfing web sites, using search engines.

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[DMC-31]ELEMENTARY MECH. & CIVIL ENGG.

1. Applied MechanicsGeneral condition of equilibrium of a rigid bodyunder coplaner forces. Concept of tie, strut, beamand trusses. Shear force and bending moment diagramof simply supported beam and cantilever for pointload. Concept of centre of gravity, moment of inertiaand friction. Mechanical advantage, velocity ratio,mechanical efficiency of simple machines: Liftingmachines much as pulley, differential pulley, wheeland axle, simple screw jack, worm and worm wheel.
2. Strength of Materials & Power Transmission:Stress, strain, elastic constraints, stress incircular shaft subjected to pure torsion only.Rivetted and bolted joints. Power transmission bysolid and hollow shaft. Gear trains - simple and compound, fly wheel. Rope and belts - velocity ratio,length, size of belt and power transmited.
3. Hydraulics & Hydraulic Machines:Properties of fluids, pressure of fluid and itsmeasurement. Flow of fluids velocity and discharge,Bernaulli's theorem and its application inventurimeter, flow through pipe, head loss due tofriction.water turbines- Pelton and Reaction,reciprocating and centrifugal pump.
4. Heat Engines:External & internal combustion engines, working ofdiesel and petrol engine, horse power of IC engines,steam generator, constrcution and working of Bobcock& Wilcox boiler, Cochran boiler, condenser, steamturbine classifcation and principle of operation, gasturbine.
5. Civil Engineering Materials:General idea of raw materials, manufacturing process,properties and uses of Bricks, lime, cement andTimber.
6. Foundation

(i) Bearing capacity of soil and its importance, need offoundation for electrical machines.(ii) Foundations for heavy, light and vibrating machines.
(iii) Concrete proportion, mixing w/c ratio, workabilityRCC and its use. 7. Surveying
(i) Basics of chaining and leveling
(ii) Description of Instruments used

[DMC-31P] ELEMENTRY MECH. & CIVIL ENGG.LAB.

Part I :(Mechanical Engineering Laboratory/Hydraulics laboratory

(i) To operate a diesel engine (starting, running andshutting down) and to study lubricating and coolingsystem of the engine.
(ii) To determine BHP of diesel or petrol engine and showthat BHP is directly proportional to revolution perminute of engine shaft.
(iii) To determine mechanical advantage, velocity ratio,efficiency and effort loss due to friction in screwjack.
(iv) To verify Bernoulli's theorem with the help ofBernoulli's appratus.
(v) To determine head loss due to friction in GI pipes.
(vi) To operate the Pelton wheel and Francis Turbine andto understand its construction and working.
(vii) To perform tensile test on mild steel and aluminiumwire specimen and compare the result.
(viii) To do alignement and coupling of a motor generatorset.

Part II: (Civil Engineering Laboratory):
(i) Chain survey of a small area
(a) Ranging a line
(b) Chaining a line
(c) Taking offset on the chain line and recording thefield book.
(ii) Leveling
(a) To find the difference in level between severalpoints by single setting by the use of dumpy level.
(b) To find the difference in level between two distantpoints by (i) Rise & Fall method, (ii) Line ofcollimation method.
Models:
1. Cut section models of turbine, pumps.
2. Cut section models boilers, condensers.
3. Cut section models of diesel and petrol engines.
4. Models showing power transmission by, rope, belt,chain and gears. 5. Models of clutch and brakes, shaft conpling.
6. Model of chain pulley block and three systems ofpulleys.

[DEE-32] ELECTRICAL MACHINE – I

1. Generalised Treatment of Electrical Machines:-
1.1 Definitions of motor and generator.
1.2 Torque due to alignment of two magnetic fields andconcept of torque angle 1.3 Elementry concept of generator and motor
1.4 Classification of main types of electrical machinesand their generalised treatments in respect of their Working (only d.c. machine to be dealtwith).
1.5 Common features of rotating electrical machines.
2. D.C. Machines
2.1 Construction of d.c. machines.
2.2 E.M.F. equation
2.3 Electromagnetic torque (torque equation)
2.4 Principle of generating and motoring action.
2.5 Speed and torque equation
2.6 Armature reaction and commutation in d.c. m/cs.
2.7 Factors controling speed of d.c. motor.
2.8 Speed control methods and starters for d.c. m/cs.
2.9 Characterstics and application of D.C. generators andmotors.
3. Transformer
3.1 Classification, construction, principle and working of 1 ph. and 3 ph. transformer.
3.2 E.M.F. equation.
3.3 Phasor diagram on noload and load.
3.4 Transformer connections.
3.5 Losses and efficiency.
3.6 Voltage drops and regulation.
3.7 Connections for parallel operation.
3.8 Cooling
3.9 Testing of transformer as per IS specification (Typetest and routine test, etc.)
3.10 Special transformer - current transformer, potentialtransformer uses of C.T. and P.T., auto transformer,rectifier transformer, dry type transformer, furnacetransformer earthing transformer, tractiontransformer and its use.
3.11 Welding transformer: constructional detail,comparison between power and welding transformer.
4. A. C. Generator (Alternator)Working principle, construction, Full pitch and shortpitch winding, pitch factor or coil span factor,distribution or winding factor, E.M.F. equation,rating of alternators, armature reaction, voltagedrops in allternator, vector diagram of lodedalternator, voltage regulation and its determination,Efficiency of alternator, conditions for paralleloperation, Methods of parallel operation, operationof alternators when connected to infinite bus bar.Voltage regulator like tirril and brown bovery type.

[DEE-32P] ELECTRICAL MACHINE LAB

1. Measurement of induced emf and magnetising currentunder open circuit condition in D.C. generators.
2. Determination of the relationship between terminalvoltage and load current keeping speed constant for
(a) Separately excited generator keeping excitationconstant
(b) D.C. shunt generator.
3. To measure the variation in no load speed of aseparately excited d.c. motor for the variation in
(a) Armature circuit resistance
(b) Field circuit resistance.
4. Measurement of the speed of a d.c. series motor as afunction of the load torque.
5. (a) No-load and short circuit test on a single phasetransformer.
(b) Determination of efficiency and regulation oftransformer.
6. To determine the insulation resistance of atransformer at no load and at full laod condition.
7. Determination of the magnetisation curve of analternator (a) at no-load rated speed,(b) at no load half rated speed and (c) at full non-inductiveload and rated speed.
8. Determination of the relationship between terminalvoltage and load current of an alternator keeping exitation and speed constant.
9. Determination of regulation and efficiency of analternator from open circuit and short circuittests.
10. Parallel operation of polyphase alternators and laodsharing.