3E1641

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3E1641

B. Tech III Sem. (Main) Exam. Jan. 2016
Electronic Instrumentation & Control
3EI1 Electronic Devices & Circuits
Common to EE, EC & EIC

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. Scientific Calculator. 2. NIL

UNIT-I

Q.1 Explain Hall Effect and its applications. What properties of a semiconductor are determined from a Hall Effect experiment? [16]

OR

Q.1 Give the Energy Band description of semiconductors? If the effective mass of air electron is equal to thrice the effective mass of a holes, find the distance in eV of the fermi level in an intrinsic semi conductor from the centre of the forbidden band at room temperature. [16]

UNIT-II

Q.2 (a) Consider a circuit consisting of a diode 'D' a resistance 'R', and a signal source 'Vi', in series. Define - [10]

(i) Static characteristics

(ii) Dynamic characteristics

(iii) Transfer chrematistics

(iv) What is the correlation between (ii) and (iii)

(b) A silicon diode operates at 0.4V. Calculate the factor by which the current will be multiplied when the temperature is increased from 25°C to 150°C. [6]

OR

Q.2 (a) What are the general characteristics of diode clipper circuits? [8]

(b) A full wave rectifier circuit is required to give a DC output voltage of 80V. Neglect resistance of diode. Find: [8]

(i) DC load current, if R_L is 5000 ohm

(ii) Efficiency of rectifier

(iii) Peck current through diode.

UNIT-III

Q.3 (a) Define the pinch – off voltage V_p. Sketch the depletion region before and after pinch – off. [8]

(b) A pnp transistor with $\beta = 60$ is connected in a common – base configuration and is biased in the forward – active mode. The collector current is $I_c = 0.85mA$. Determine - α, I_E & I_B. [8]

UNIT-V

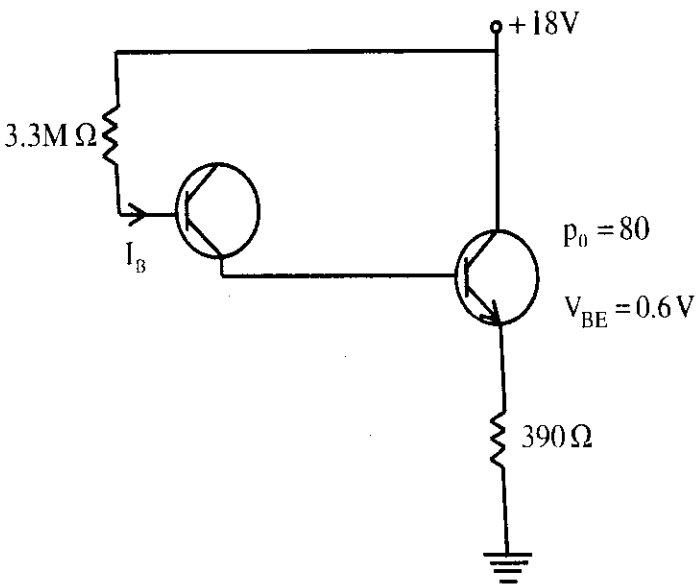
Q.5 (a) Explain a CMOS inverter. [8]

(b) Draw the circuit diagram of Darlington Amplifier. Give its Characteristics, merits and applications. [8]

OR

Q.5 (i) Discuss the frequency response curve of R-C coupled amplifier by deriving suitable derivation for low and high frequency. [8]

(ii) Calculate the DC bias voltages and currents in the circuit shown below - [8]



OR

Q.3 (a) Draw the transfer characteristics of transistor and indicate the Cut-off, Cut-in, Active and Saturation region. [8]

(b) Explain the Ebers- Moll module of transistor and with the help of it find the collector reverse saturation current. [8]

UNIT-IV

Q.4 (a) State and explain Miller's theorem with the aid of a circuit diagram. [8]

(b) Two MOSFETs having drain resistances of r_{d_1} and r_{d_2} and amplification factors of $\mu_1 + \mu_2$ respectively are connected in parallel. Show that -

(i) $$\frac{1}{r_{d_1}} + \frac{1}{r_{d_2}} = \frac{1}{r_d}$$

(ii) $$\mu = \frac{\left(\mu_1 r_{d_2} + \mu_2 r_{d_1}\right)}{\left(r_{d_1} + r_{d_2}\right)}$$

Where, r_d and μ are equivalent resistances and amplification factors respectively. [8]

OR

Q.4 (a) Distinguish between JFET and BJT. [8]

(b) Explain the construction and working of MOSFET. [8]

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3E1642

B. Tech III Sem. (Main/Back) Exam. Jan. 2016
Electrical Engineering
3EE2A Circuit Analysis – I

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

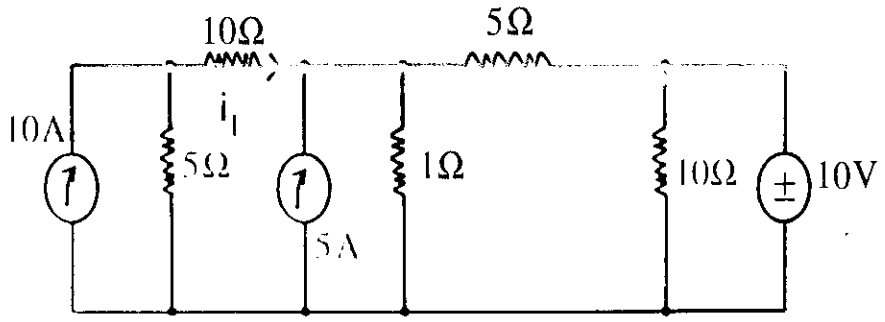
Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

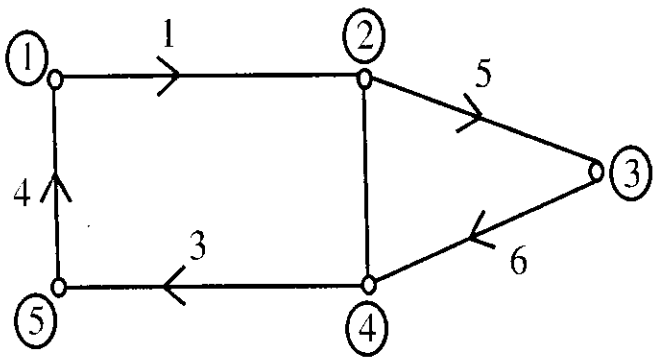
1. NIL 2. NIL

UNIT-I

Q.1 (a) Obtain the current I_1, using KVL. [8]

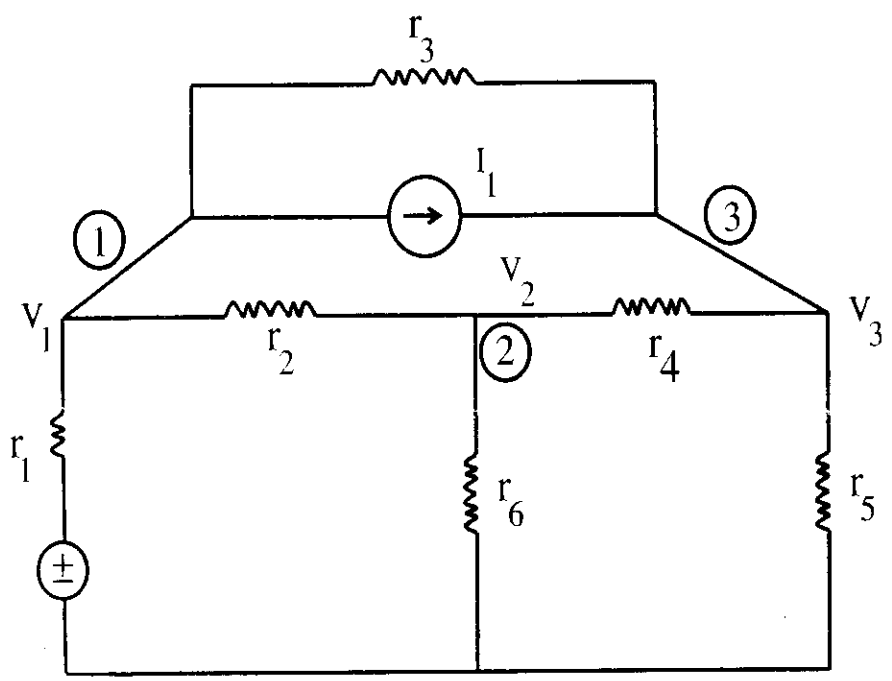


(b) Show the cut-sets for the graph of the network shown in figure and develop the fundamental cut-set matrix. [8]

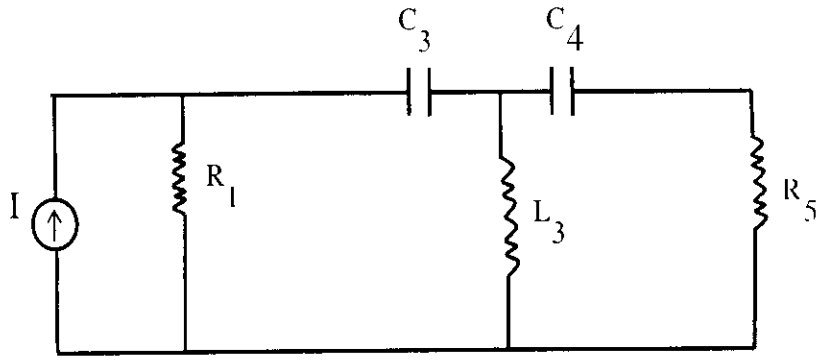


OR

Q.1 (a) Develop nodal equations in node (1), (2) & (3) in the circuit of figure - [8]



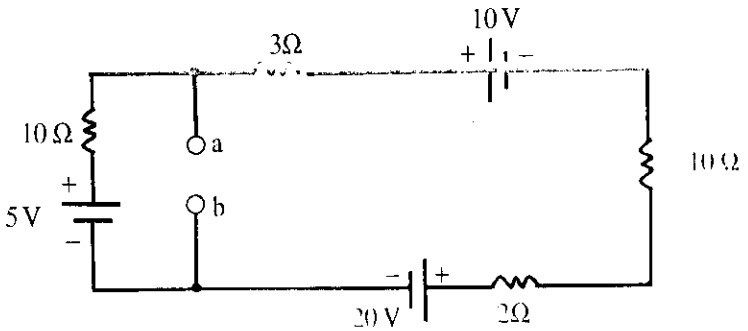
(b) Draw the dual of the network shown in figure. [8]



UNIT-II

Q.2 (a) Explain Thevenin Theorem. Also give the steps for solving a network utilizing Thevenin's Theorem. [8]

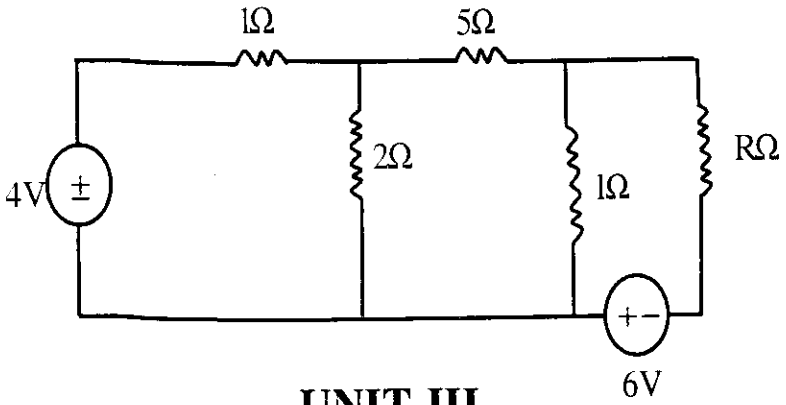
(b) Using Superposition Theorem, find the current through a link that is to be connected between terminals a - b. Assume the link resistance to be zero. [8]



OR

Q.2 (a) Explain reciprocity theorem and also give the steps for solving a network utilizing reciprocity theorem. [8]

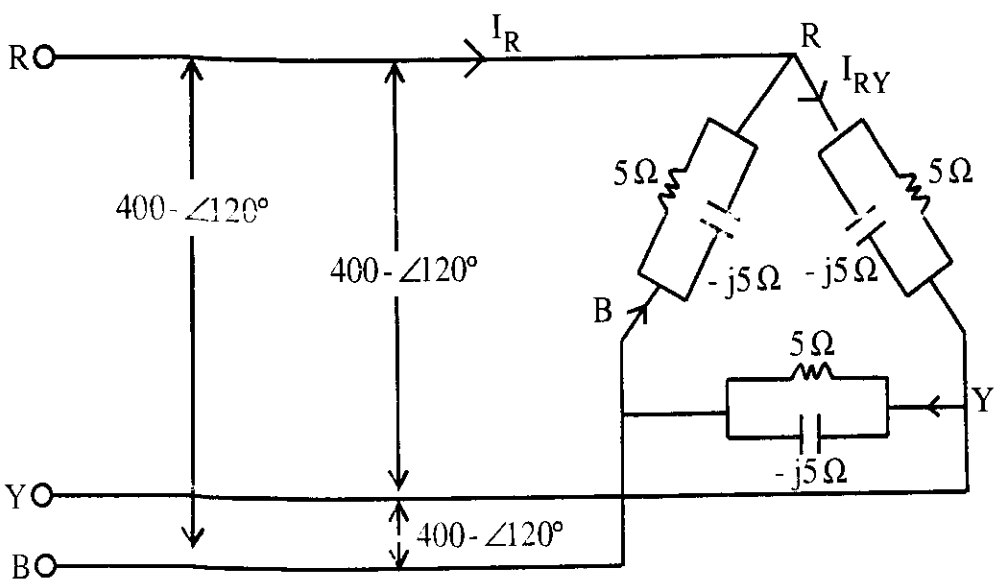
(b) Find the value of R in the circuit of figure, such that maximum power transfer takes place. What is the amount of this power? [8]



UNIT-III

Q.3 (a) Give the relationship between line and phase voltages and currents in a star-connection. [8]

(b) A delta-connected load has a parallel combination of resistance (5Ω) and capacitance reactance (-j5Ω) in each phase. If a balanced 3-phase 400V supply is applied between lines, find the phase currents and line currents and draw the phasor-diagram. [8]



OR

Q.3 (a) Give short note on - [2×4=8]

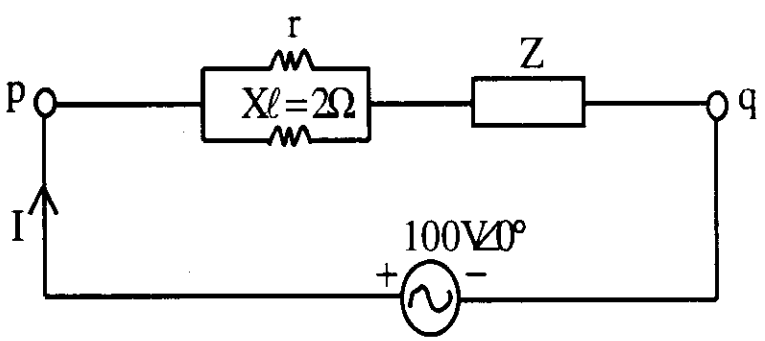
(i) Power Factor

(ii) Reactive Power

(iii) Apparent Power

(iv) Power Triangle

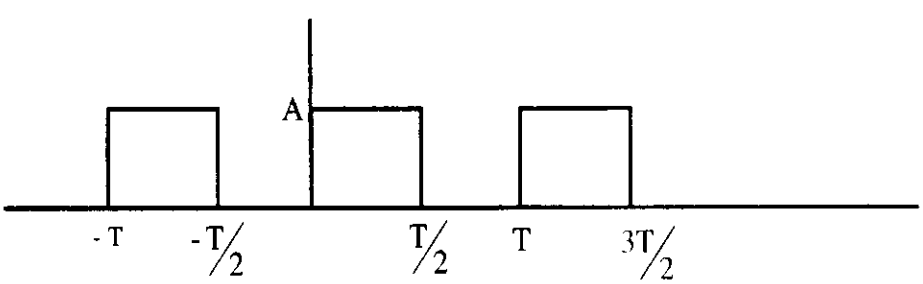
(b) A voltage of $100\angle 0°$ volts is applied across p-q terminals of the circuit shown in figure to produce current of $40\angle 10°$A. Find the value of Z, when r = 5Ω. What would be the active power consumed in Z? [8]



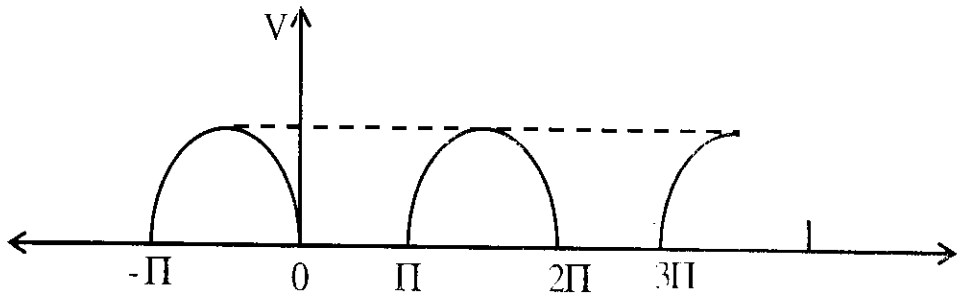
UNIT-IV

Q.4 Determine the Fourier series of the waves shown in figure. [8×2=16]

(a)

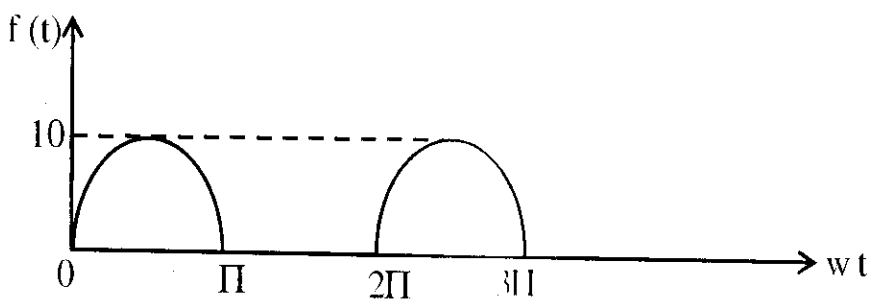


(b)

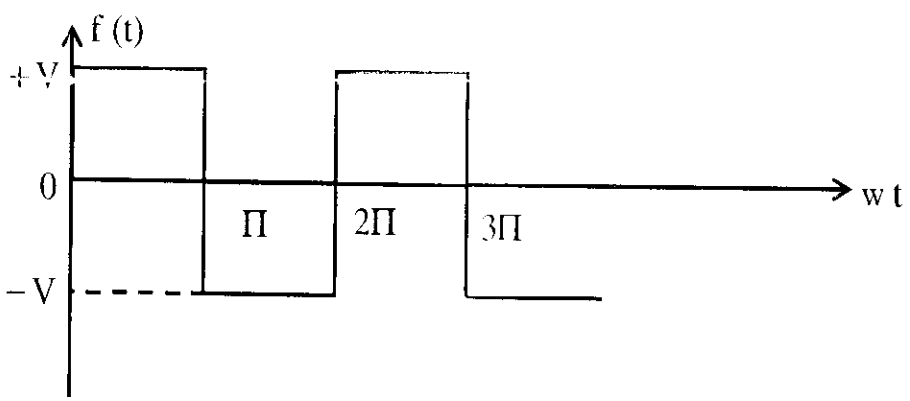


OR

Q.4 (a) Obtain the Fourier Coefficients of the waveform shown in figure. [8]



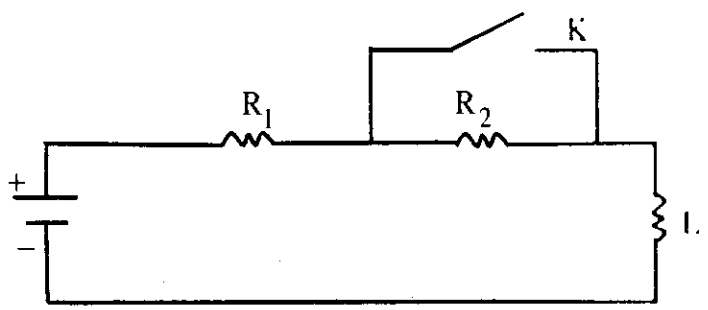
(b) Obtain the Exponential Fourier series of the waveform shown in figure. [8]



UNIT-V

Q.5 (a) Explain step response of R-L series circuit. [8]

(b) In figure, the battery voltage is applied for a steady state period. Obtain the complete expression for the current after closing the switch K. Assume $R_1=1\Omega$, $R_2=2\Omega$, L=1H, E=10V. [8]



OR

Q.5 Find the inverse of the laplace transform. [16]

$$F(s)=\frac{s^3+6s^2+11s+7}{s^2+5s+6}$$

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3E1645

B. Tech III Sem. (Main/Back) Exam. Jan. 2016
Electrical & Electronics Engineering
3EX5A Electrical Machines - I
EE, EX

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Explain principle of conversion of energy in electro-mechanical system and give its general representation. [12]

(b) A circuit coil of 500 turns with a mean diameter of 50 cms is rotated about a vertical axis in the earth's field at 40 revolutions per second. Find the instantaneous value of emf induced in the coil when its plane P is [4]

(i) Parallel

(ii) Inclined at 30° degree to the magnetic meridian.

Take value of H as 14.3 AT/m.

OR

Q.1 (a) Derive the expression of torque developed in closely excited magnetic system. Clearly explain the assumptions made. [8]

(b) Two coils with self inductance 1H and 4H have a mutual inductance of 1H. The RMS value of current following in the two coils is 4A and 1A respectively. Find- [8]

(i) The coupling factor

(ii) The energy stored in magnetic system

UNIT-II

Q.2 Write short note on commutation in DC machine. Discuss the method of improving commutation? [16]

OR

Q.2 What are the different types of dc generators according to the ways in which fields are excited? Show the connection diagram of each type. [16]

UNIT-III

Q.3 Explain the Hopkinson's Method of testing of the dc machines. Differentiate this model with the Swinburne's method of testing of the dc machines. Can the Swinburne's method of testing of the dc machines be applied on dc series machines? [16]

OR

Q.3 (a) Establish an expression for the speed of dc motor with the help of neat connection diagram. Explain the method of controlling the speed of dc motor below and above the rated speed. Justify the statement that dc series motors are never started at no load. [10]

(b) A 250V dc shunt motor runs at 1000 rpm at no load & takes 5Amp. The total armature and shunt yield resistance are 0.2Ω & 250Ω respectively. Calculate the speed under loaded condition taking 50Amp. The armature reaction weakens the yield by 3%. [6]

UNIT-IV

Q.4 In what way a practical transformer differ from an ideal transformer? Develop an equivalent circuit for the practical transformer. [16]

OR

Q.4 (a) Explain the process of finding efficiency of transformer by Sumpher's test. [12]

(b) What is Welding Transformer? [4]

UNIT-V

Q.5 (a) Explain the Scott connection with proper circuit diagram. [8]

(b) Write short note on open – delta connection. [8]

OR

Q.5 (a) Explain in detail the double star connection for obtaining 6-phase supply from 3-phase supply. [8]

(b) Write short note on inrush of magnetizing current in poly phase transformer. [8]

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Roll No. _____ Total No of Pages: 4

3E1646

B. Tech III Sem. (Main/Back) Exam. Jan. 2016
Electrical & Electronics Engineering
3EX6A Advanced Engineering Mathematics - I
Common to EE, EX

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Find Laplace transform of $t^2 H(t-3)$. [4]

(b) Find inverse Laplace transform of- $\tan^{-1}\frac{2}{S^2}$. [4]

(c) Solve the following differential equation using Laplace transform technique:
$(D^4 - 1)\, y = 1, \quad y(0) = y'(0) = y''(0) = y'''(0) = 0$ [8]

OR

Q.1 (a) Find Laplace transform of- $\frac{e^{-t}\sin t}{t}$. [4]

(b) Find inverse Laplace transform of $\frac{se^{-2s}}{s^2 - 1}$. [4]

(c) Solve the following partial differential equation using Laplace transform technique: [8]

$$\frac{\partial u}{\partial t} = 2\frac{\partial^2 u}{\partial x^2}$$

subject to the constraints

$u(0, t) = u(5, t) = 0$; $u(x, 0)$ 10 sm $4\pi x$.

UNIT-II

Q.2 (a) Express the function –

$$f(x) = \begin{cases} \frac{2}{\pi}\sin x & ; 0 \le x \le \pi \\ 0 & ; \quad x > \pi \end{cases}$$

in integral form with the help of Fourier sine transform and hence evaluate

$$\int_0^\infty \frac{\sin(\pi\lambda)\sin(x\lambda)}{(1-\lambda^2)}\,d\lambda$$ [6+2=8]

(b) Find discrete Fourier transform of the sequence $\{d_q\} = \{1, 2, 3, 4\}$. [8]

OR

Q.2 (a) Prove that - $\int_0^\infty \frac{\cos x\lambda}{(1-\lambda^2)}\,d\lambda = \frac{\pi e^{-x}}{2}$, $x \ge 0$ [8]

(b) Solve the following partial differential equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} \; ; \; x > 0, t > 0$$

subject to the constraints

$u = 0$, when $x = 0, t > 0$

$$u = \begin{cases} 1 & ; \quad 0 < x < 1 \\ 0 & \quad x \ge 1 \end{cases}$$, when $t = 0$ [8]

UNIT-III

Q.3 (a) Find Fourier series to represent the function – [8]

$$f(x)=\begin{cases} 0 & ; -\pi<x<0 \\ \frac{\pi x}{4} & ; \quad 0<x<\pi \end{cases}$$

Hence deduce that $\frac{\pi^2}{8}=\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+.....$

(b) Find the curve through two points (x_1, y_1) and (x_2, y_2) which when rotated about the x- axis, gives minimum surface area. [8]

OR

Q.3 (a) Find half range cosine series for the function $f(x) = x(\pi - x)$; $x \in (0, \pi)$ [8]

(b) Find the shape of the plane curve of fixed length l so that it encloses maximum area. [8]

UNIT-IV

Q.4 (a) Show that the function $f(z)=\sqrt{|xy|}$ is not regular at origin, although Cauchy Riemann equations are satisfied. [8]

(b) Find the image of the infinite step $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation $w=\frac{1}{z}$. Also show the regions graphically. [6+2=8]

OR

Q.4 (a) Find the bilinear transformation that maps the points 0,- i, -1 in z- plane onto the points w = i, 1, 0. What are the invariant points of this transformation? [6+2=8]

(b) Using Cauchy's integral formula, evaluate –

$\int \frac{z\,dz}{(z-2)(z-3)^2}$ where C is the circle $|z-3|=\frac{1}{2}$. [8]

UNIT-V

Q.5 (a) Find Laurent's series for the function $f(z) = \frac{1}{z(1-z)}$ in the region -

(i) $|z+1| < 1$ [2½]

(ii) $1 < |z+1| < 2$ [2½]

(iii) $|z+1| > 2$ [3]

(b) Find the residue of f (z) at each of its singularity, where f (z) is -

(i) $\frac{1+e^z}{\sin z + z\cos z}$ [4]

(ii) $\frac{e^z}{z(z+1)^2}$ [4]

OR

Q.5 (a) Using Cauchy's residue theorem, evaluate the integral $\int_c \frac{z-3}{z^2+2z+5}\,dz$,

where C is the curve $|z+1-i| = 2$. [8]

(b) Show that -

$$\int_{-\infty}^{\infty} \frac{x^2-x+2}{x^4+10x^2+9}\,dx = \frac{5\pi}{12}$$ [8]

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3E1485

B. Tech III Sem. (Back) Exam. Jan. 2016
Elect. Engineering
3EE5(O) Electrical Measurements

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Define the working of moving coil with diagram. Give the application of instruments used for measuring of currents [8]

(b) Discuss the available errors in wattmeter and their adjustments. [8]

OR

Q.1 (a) Explain the testing and calibration of single phase energy meter by phantom loading. [8]

(b) Briefly explain torque equation of electrodynamic instruments. [8]

UNIT-II

Q.2 (a) Define Blondel's theorem for n phase, p wire system. [8]

(b) Explain the construction and working of 3 phase induction type energy meter. [8]

OR

Q.3 (b) Explain the construction and operation of current and potential transformers. Discuss effect of variation of power factor on errors. [16]

UNIT-III

Q.4 (a) Discuss the construction, operation and standardization of DC potentiometers. Compare slide wire and cromption potentiometers. [16]

OR

Q.4 (b) How can we use potentiometers for resistance, voltmeter and ammeter calibrations. List down the applications of AC potentiometers. [16]

UNIT-IV

Q.4 (a) Discuss the measurement of medium resistance using wheat stone bridge method. Give suitable diagrams and related mathematical expressions. [10]

(b) Classify the resistance on the basis of range. [6]

OR

Q.4 (a) Write a short note on measurement of earth resistance. [8]

(b) Discuss Kelvin's double bridge method of resistance measurement [8]

UNIT-V

Q.5 Write short note on the following with reference to AC bridges

(a) sources and detectors [8]

(b) Wagner earth device [8]

OR

Q.5 (a) Explain the working, block diagram and utility of De Sauty bridge for capacitance measurement. [8]

(b) What are the sources of error in bridge measurement? List down the precautions. [8]
