

3E1642	Roll No. _____	Total No. of Pages : <span style="border: 1px solid black; padding: 2px;">4</span>
	3E1642	
<b>B. Tech. (Sem. III) (Main/Back) Examination, December - 2017</b> <b>Electrical Engg.</b> <b>3EE2A Circuit Analysis - I</b>		

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

*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

- 1 (a) Explain the variation of resistance, inductance and capacitance reactance with frequency. 8
- (b) A variable frequency constant voltage signal generator supplies a RLC circuit at sinusoidal mode. Prove that the frequency at which maximum voltage across the inductor would appear is

$$w = \frac{1}{\sqrt{LC}} \sqrt{\frac{2Q_0^2}{2Q_0^2 - 1}}$$

8

OR

1 (a) Write down the Principle of duality.

4

(b) Fig. 1(b) represents a resistive circuit. Determine the number of branches, number of nodes and number of links. Write down the incidence matrix for the given network. Also develop the network equilibrium equation.

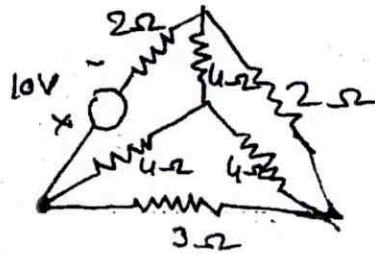


Fig. 1(b)

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UNIT - II

2 (a) Explain the Miller's theorem in AC and DC circuit.

8

(b) Find  $V_L$  in the circuit of Fig. 2(b) using superposition theorem.

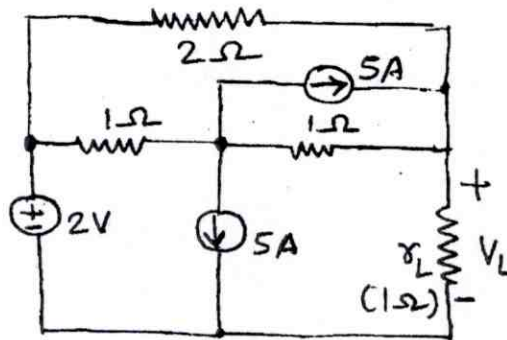


Fig. 2(b)

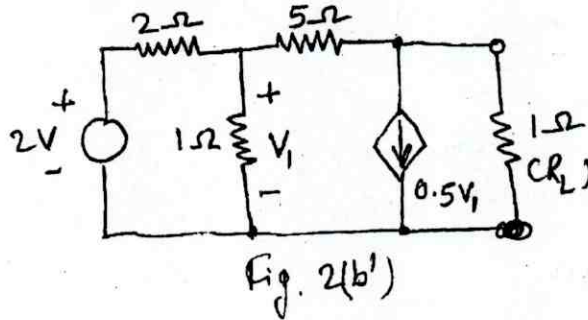
8

OR

2 (a) Explain the Thevenin's theorem.

6

- (b) What is the power loss in the  $1\Omega$  resistance ( $R_L$ ) of the circuit shown in fig. 2(b'). Use Norton's theorem.



10

### UNIT - III

- 3 (a) A Y connected alternator has 231 V/ph. It supplies a set of lighting loads at phase R, having phase impedance of  $40 \angle 0^\circ \Omega$ , a capacitance load of  $10 \angle -10^\circ \Omega$  at phase Y and an inductive load of  $5 \angle 45^\circ \Omega$  at phase B. The loads are connected in delta. Obtain the phase currents, line currents and line voltages. 8
- (b) Explain the measurement of power and power factor of a balanced three phase load by using two wattmeter method. 8

OR

- 3 (a) Write down the relationship between line and phase voltages and currents in delta connection with a suitable diagram. 6
- (b) A three phase induction motor takes 100 kVA at 0.6 p.f. (lag) from a 440 V three phase 50 Hz source (balanced). There is another load on the same line and the load is connected in form of a  $\Delta$  having  $8\Omega$  resistance and  $-j 24\Omega$  reactance in series in each phase. Find the total VA power, average-power, reactive power, line current and the p.f. of the combination. 10

### UNIT - IV

- 4 (a) What is the complex periodic waves ? Explain full analysis of these wave using Fourier series. 8

(b) Determine the Fourier series of the wave shown in

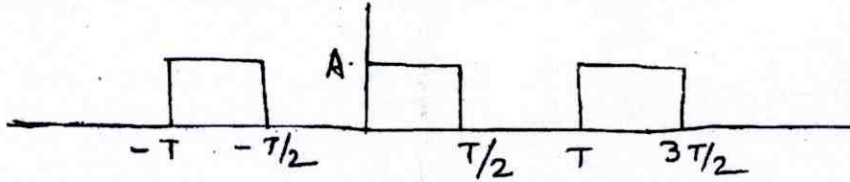


Fig. 4(b).

8

OR

4 Find the line spectrum of following waves using Fourier analysis.

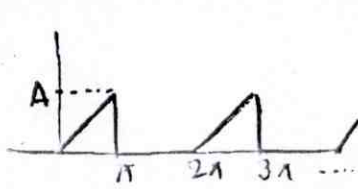


Fig. 4(a)

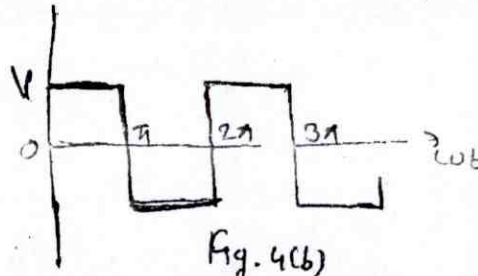


Fig. 4(b)

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UNIT - V

- 5 (a) Derive the expression for step response of a RL series and parallel ckt. 8
- (b) In fig. 5(b) the battery voltage is applied for a steady state period. Obtain the complete expression for the current after closing the switch K. Assume  $R_1 = 1 \Omega$ ,  $R_2 = 2 \Omega$ ,  $L = 1 H$ ,  $E = 10 V$ .

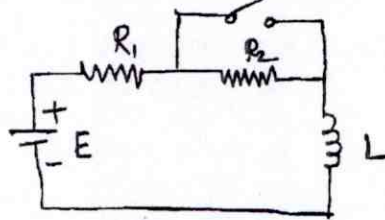


Fig. 5(b).

8

OR

- 5 Explain the following :
- (a) Pulse response of series R.C. circuit.
- (b) Impulse response of series R.C. circuit.

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**3E1653**

**B. Tech. (Sem. III) (Main/Back) Examination, December - 2017**  
**Electronics & Communication Engg.**  
**3EC3A Digital Electronics**

**Time : 3 Hours**

**Maximum Marks : 80**  
**Min. Passing Marks : 26**

*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

1 (a) Find the 11's complement of following numbers :

(i)  $(935)_{12}$  (ii)  $(267)_{12}$

6

(b) X and Y are successive digits in positional number system and  $(XY)_r = (25)_{10}$  and  $(YX)_r = (31)_{10}$ . Determine the value of X, Y and r.

6

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[ P.T.O.

- (c) A register contains 2's complement 10010110. What will be the contain of register if it is divided by 2.

4

OR

- 1 (a) Consider the signed binary number are  $A = 01000110$  and  $B = 11010011$  where  $B$  is in 2's complement form. Find the value of following Mathematical expression :

- (i)  $A + B$
- (ii)  $A - B$
- (iii)  $B - A$
- (iv)  $-A - B$

8

- (b) Why the gray code is also known as reflected code ? Write a brief note on gray code and its applications.

2

8

## UNIT - II

- 2 (a) What do you understand by following properties of logic family :
- (i) Fan out
  - (ii) Figure of merit
  - (iii) Noise margin
  - (iv) Current mode logic.

8

- (b) Find the output boolean function ( $Y$ ) in terms of  $A$  and  $B$  as shown in Fig. 1.

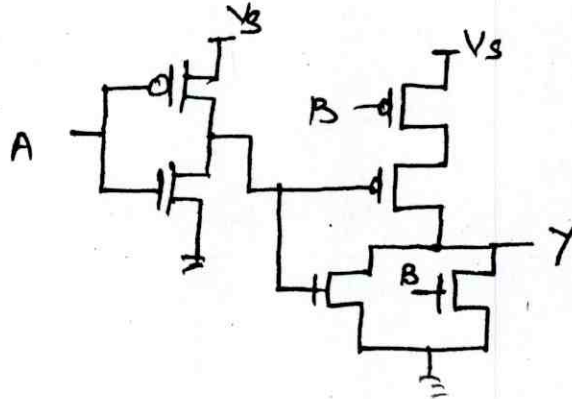


Fig. 1

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OR

- 2 (a) A boolean function is implemented using NMOS logic family and shown in Fig. 2. How the output  $Y$  can be made 0 if  $C$  and  $D$  both values are 0. Also find implemented boolean function.

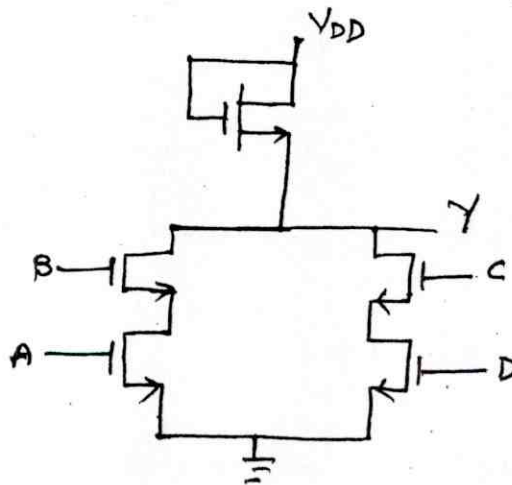


Fig. 2

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- (b) State the advantage of using totem pole output type TTL over open collector output TTL. Also explain the tristate output logic type TTL.

8

### UNIT - III

- 3 (a) Simplify the following boolean function using tabulation method :

$$F = \sum m (0, 1, 2, 8, 10, 11, 14, 15) \cdot d(9, 12).$$

10

- (b) Simplify the following boolean function using K-map :

$$Y = (A + B)(A + \bar{C})(\bar{A} + \bar{B})(\bar{A} + C).$$

6

### OR

- 3 (a) The logic gate  $G_1$  and  $G_2$  as shown in Fig. 3 have propagation delay of 10 ns and 20 ns respectively. If input  $v_i$  makes an abrupt change from logic-0 to logic-1 at time  $t = t_0$ , then draw output waveform ( $v_o$ ).

ns  $\rightarrow$  nano second.

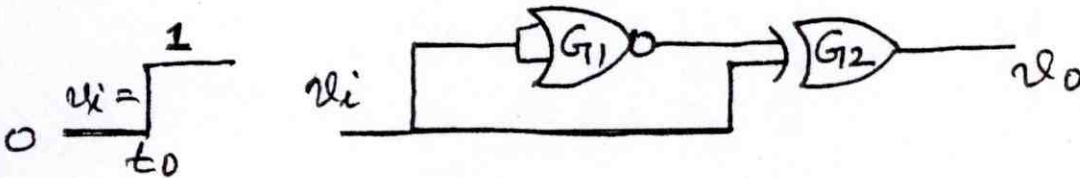


Fig. 3

8

- (b) Minimize the following boolean function using K-map :

$$f(a, b, c, d) = \sum m (0, 1, 2, 8, 9) \cdot d(4, 10, 12)$$

8



UNIT - IV

- 4 (a) How many 3 : 8 line decoder with enable input are required to construct 6 : 64 line decoder without using any other logic ? Draw its block diagram also. 8
- (b) Find the boolean function implemented by 4 : 1 mux as shown in Fig. 4.

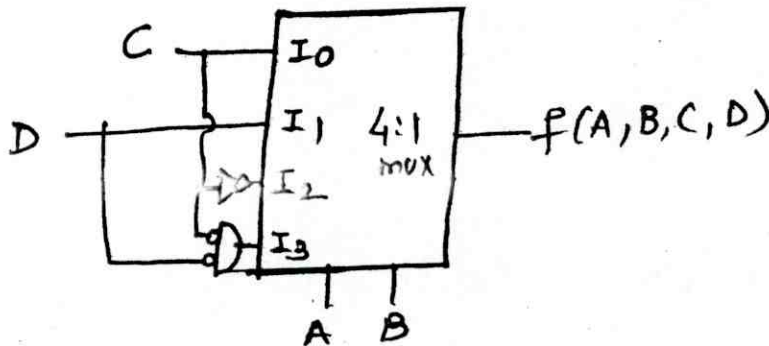


Fig. 4

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OR

- 4 (a) Implement a full subtractor using two 4 : 1 multiplexer. 8
- (b) Find the output of following decoder circuit as shown in Fig. 5.

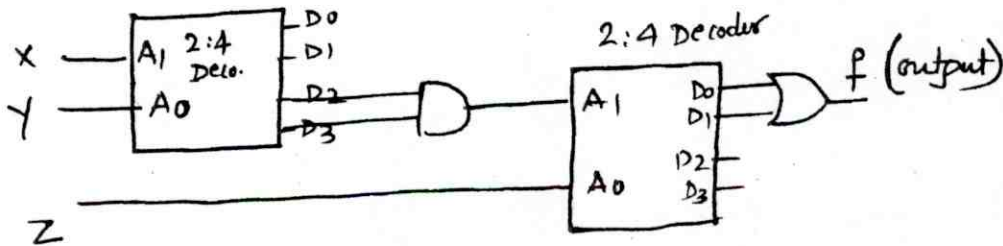


Fig. 5

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- (c) Find the output of 4:1 multiplexer as shown in Fig. 6.

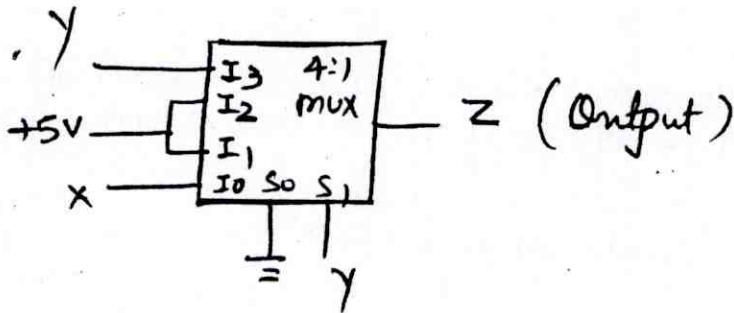


Fig. 6

4

### UNIT - V

- 5 (a) State the difference between latch and flip flop. 4
- (b) Explain the truth table, circuit diagram and working of universal flip flop. 4
- (c) What are the counting states  $(Q_1, Q_0)$  for the circuit using D - flip flop as shown in Fig. 7 ? 4

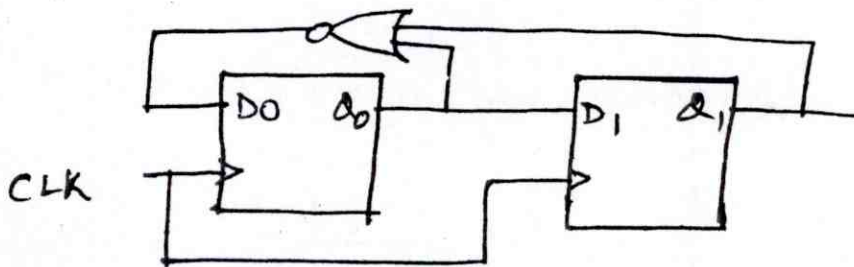


Fig. 7

Assume initial state  $(Q_1, Q_0)$  is 00.

8

OR

6

- 5 (a) Explain the procedure for conversion of JK flip flop to RS flip flop. 5
- (b) What is race around condition ? How it can be avoided ? 5
- (c) Design a binary counter with following binary sequence using D - flip flop :  
0, 1, 3, 2, 6, 4, 5, 7 and repeat. 6

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**B. Tech. (Sem. III) (Main / Back) Examination, December - 2017**  
**Computer Sc. & Engg.**  
**3CS4A Object Oriented Programming**  
**EE,EX,CS,IT**

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

*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

- 1 (a) Define structure in C and how it is declared. Explain with suitable example. 8
- (b) How are structure element accessed using a pointer ? Which operator is used give example ? 8

**OR**

- 1 (a) Explain nested structure and its need with a suitable example. 8
- (b) How passing structure to function ? Give an example. 8

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[ P.T.O.

## UNIT - II

- 2 (a) Explain the concept of object oriented analysis with explanation of all steps of analysis. 8
- (b) What is the meaning of message passing ? Explain in brief. 8

**OR**

- 2 (a) How we create and destroy object dynamically using new and delete operator discuss with example. 8
- (b) Write short note on constructors and destructors in C++. 8

## UNIT - III

- 3 (a) What is type conversion in C++ ? How it is achieved in user defined data types ? 8
- (b) What is operator overloading ? Why do need operator overloading ? 8

**OR**

- 3 (a) What are the limitation of overloading unary increment / decrement operator ? Write a program to overload unary operator. 8
- (b) How we concatenate two string by (+) operator give suitable example. 8

## UNIT - IV

- 4 (a) What is inheritance ? What are the various forms of inheritance ?  
Explain each with the help of examples. 10
- (b) Define virtual function. Why we need it ? 6

OR

- 4 (a) Explain the term dynamic binding. How it is useful in OOPs ? 3
- (b) Discuss abstract data type concept. How is an abstract class useful ? 8

## UNIT - V

- 5 (a) Design two classes to show the multiple inheritance. How does a object of derived class access the member of base class ? 8
- (b) Write short note on Templates. 8

OR

- 5 (a) Explain the effect of using the access specifiers with class members on inheritance. 8
- (b) Write short note on exception handling. 8

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Roll No. : \_\_\_\_\_

Total Printed Pages : 4

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**B. Tech. (Sem. III) (Mercy Back) Examination, December 2017**  
**Electrical Engg.**  
**3EE5A Electrical Machines - I**

**Time : 3 Hours**

**Maximum Marks : 80**  
**Min. Passing Marks : 24**

*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

- 1 (a) Explain the operation of a magnetic circuit when AC current is applied to the coil wound on iron core. Draw the B-H curve and obtain the expression for hysteresis. 8
- (b) Determine the permeability of a magnetic material and the factor on which it depends. 8

### OR

- 1 (a) Explain AC operation of magnetic circuits and derive the energy stored in magnetic field. 8

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[ P.T.O.

- (b) The area of the hysteresis loop of the given magnetic material is  $50 \text{ cm}^2$  with the two axes scaled as  $1 \text{ cm} = 20 \text{ AT}$  and  $1 \text{ cm} = 50 \text{ m Wb}$ , for  $50 \text{ Hz}$  frequency find the total hysteresis loss.

8

### UNIT - II

- 2 (a) Draw the load characteristics of DC compound generator (cumulative and differential) generators and explain.
- (b) A  $24 \text{ kW}$ ,  $250 \text{ V}$ ,  $1600 \text{ rpm}$  separately excited DC generator has armature circuit resistance of  $0.1 \text{ ohm}$ . The machine is first run at rated speed and the field current is adjusted to give an open circuit voltage of  $260 \text{ V}$ . Now when the generator is loaded to deliver its rated current, the speed of the driving motor is found to be  $1500 \text{ rpm}$ . Compute the terminal voltage of the generator under these conditions. Field flux remains unaltered.

8

8

### OR

- 2 (a) Describe the features of DC series generators and distinguish it from the other type of DC generators. Explain.
- (b) Explain the process of communication and the methods to improve the communications.

8

8

### UNIT - III

- 3 (a) (i) What are the advantages of field flux control method over the circuit resistance controlled method employed for the speed control of DC motors ?
- (ii) For a DC motor, the field-flux control method is called a constant power drive method. Explain.

8



- (b) A DC series motor, running a fan at 1000 rpm, takes 50 A from 250 V mains. The armature plus field resistance is 0.6 ohm. If an additional resistance of 4.4 ohm is inserted in series with the armature circuit, find the motor speed.

8

**OR**

- 3 (a) Discuss the Swinburne's test and explain the procedure to predetermine the efficiency of a DC motor.
- (b) A 10 kW, 240 V, DC shunt motor draw a line current 5.2 A while running at no-load speed of 1200 rpm from a 240 V DC supply. It has an armature resistance of 0.25 ohm and a field resistance of 160 ohm. Estimate the efficiency of the motor when it delivers rated load.

8

8

**UNIT - IV**

- 4 (a) In what way a practical transformer differs from an ideal transformer ? Develop the equivalent circuit for the practical transformer.
- (b) Explain the need of parallel operation of single phase transformers. Give the condition to be satisfied for their successful parallel operation.

8

8

**OR**

- 4 (a) Define an auto transformer. Derive the expression showing the saving of copper when a two winding transformer is converted into an autotransformer.
- (b) A 220 V, 60 Hz single phase transformer has a hysteresis loss of 340 watts and eddy current loss of 120 watts. If the transformer is operated from 230 V, 50 Hz supply mains, then compute its total core loss. Assume Steinmetz constant equal to 1.6.

8

8

## UNIT - V

- 5 (a) A 3-phase step down transformer is connected to 6.6 kV mains and takes 100 A. Calculate the secondary line voltage and line current for the (i)  $\Delta/\Delta$  (ii) Y/Y (iii)  $\Delta/Y$  (iv) Y/ $\Delta$  connection. The ratio of turn per phase is 12 and neglect no load losses. 8
- (b) Explain the open delta connection to carry out 3-phase operation with help of two transformers. State its disadvantages. 8

## OR

- 5 (a) With the help of circuit and phasor diagram explain the 3 phase to 6 phase transformation using double star transformation method. What are their relative merits and demerits ? 8
- (b) Explain scott connection for 3 phase to 2 phase conversion and show that the primary neutral divides the teaser primary winding in the ratio 2:1. 8

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B. Tech. (Sem. III) (Mercy Back) Examination, December - 2017  
 Electrical Engg.  
 3EE6A Advanced Engg. Mathematics - I

Time : 3 Hours

Maximum Marks : 80  
 Min. Passing Marks : 26

*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

1 (a) Find the Laplace transform of  $te^{at} \sin at$ .

4

(b) Evaluate  $L^{-1} \left\{ \frac{1}{S^3(S^2+1)} \right\}$ .

4

(c) Solve the following differential equation using Laplace transform technique.

$$(D^2 - 3D + 2)x = 1 - e^{2t}, x(0) = 1, x'(0) = 0$$

8

OR

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1

[ P.T.O.

1 (a) Find the Laplace transform of  $\frac{\cos at - \cos bt}{t}$ .

4

(b) Evaluate the following  $L^{-1} \left\{ \frac{e^{-5S}}{(S-2)^4} \right\}$ .

4

(c) Solve

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

subject to the constraints

$$u(x, 0) = 3 \sin 2\pi x, u(0, t) = 0 = u(1, t) \text{ where } 0 < x < 1, t > 0.$$

8

### UNIT - II

2 (a) Express  $f(x) = \begin{cases} 1, & 0 \leq x \leq \pi \\ 0, & x > \pi \end{cases}$

as a Fourier sine integral and hence evaluate

$$\int_0^{\infty} \frac{1 - \cos \pi S}{S} \sin x S dS$$

(b) Obtain the discrete Fourier transform of the sequence

$$\{g_k\} = \{1, 0, -1\}$$

8

OR

8

2 (a) Find the Fourier transform of  $f(x) = \begin{cases} 1, & |x| \leq a \\ 0, & |x| > a \end{cases}$ . Also evaluate

$$\int_{-\infty}^{\infty} \frac{\sin \lambda a \cos \lambda x}{\lambda} d\lambda.$$

8

- (b) Solve the following Partial differential equation

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

given  $u(0, t) = u_0, t > 0$

$$u(x, 0) = 0, x > 0$$

Also,  $u$  and  $\frac{\partial u}{\partial x}$  approach to zero as  $x \rightarrow \infty$ .

8

### UNIT - III

- 3 (a) Find the Fourier series to represent

$$f(x) = |x| \text{ for } -\pi < x < \pi$$

8

- (b) Obtain the shortest distance curve between two given points in a plane.

8

OR

- 3 (a) Find Half range sine series for the function

$$f(x) = 2x - 1 \text{ in } 0 < x < 1$$

8

- (b) Find a plane curve of fixed Perimeter and Maximum Area.

8

### UNIT - IV

- 4 (a) Determine the Analytic function  $w = u + iv$  if

$$u = e^{2x} (x \cos 2y - y \sin 2y)$$

8

- (b) Show that the transformation  $w = \frac{2z+3}{z-4}$  maps the circle  $x^2 + y^2 - 4x = 0$  into the straight line  $4u + 3 = 0$ .

8

OR

- 4 (a) Find the Bilinear transformation which transform the point  $z = 2, 1, 0$  in to  $w = 1, 0, i$  respectively. 8

- (b) Evaluate the following integral

$$\oint_C \frac{1-2z}{z(z-1)(z-2)} dz \text{ where } C \text{ is the circle } |z|=1.5.$$

8

### UNIT - V

- 5 (a) Expand the function  $\frac{1}{(z-1)(z-2)}$  for

(i)  $|z| < 1$

(ii)  $|z| > 2$

(iii)  $1 < |z| < 2$

in Laurent's series. 8

- (b) Find the residue of  $\frac{z^2 - 2z}{(z+1)^2(z^2+4)}$  at all its poles in the finite plane. 8

OR

- 5 (a) Use Cauchy Residue theorem to evaluate the following integral :

$$\oint_C \frac{z-1}{(z+1)^2(z-2)} dz, \quad C; |z-i|=2$$

8

- (b) Evaluate

$$\int_0^{\infty} \frac{dx}{(x^2+1)^2}$$

8

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3E1485

**B. Tech. (Sem. III) (Mercy Back) Examination, December - 2017**  
**Electrical Engg.**  
**3EE5(O) Electrical Measurements**

Time : 3 Hours

**Maximum Marks : 80**  
**Min. Passing Marks : 24**

*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

- 1 (a) Explain the testing and calibration of single phase energy meter by phantom loading. 8
- (b) Explain the errors in wattmeter and energy meter and their compensation techniques. 8

### OR

- 1 (a) Explain why electrodynamicometer type of instruments can be used both on a.c. and d.c. Why are these instruments used as transfer instruments? 8
- (b) Explain why PMMC instruments are the most widely used instruments. Discuss their advantage and disadvantage. 8

**UNIT - II**

- 2 (a) Explain the Arnold's method for testing of current transformer. 8
- (b) Explain how power can be measured in a 3 phase circuit with the help of two wattmeters. Illustrate your answer with the help of a phasor diagram for a balanced star (wye) connected load. 8

**OR**

- 2 (a) State and derive the Blondel's theorem. 8
- (b) Explain the effect of secondary burden on the ratio and phase errors of a current transformer. 8

**UNIT - III**

- 3 (a) Explain how "true zero" is obtained in a Crompton's potentiometer. 8
- (b) Explain the reason's why a separate "Standard cell dial circuit" is provided in modern d.c. potentiometers. 8

**OR**

- 3 Explain the construction and working of co-ordinate type a.c. potentiometer. How is it standardized ? Discuss about sources of error in these instruments. 16



### UNIT - IV

- 4 (a) Explain the importance of the value Earth's resistance. Discuss about the fall of potential method for measurement of Earth resistance. 8
- (b) Explain the principle of working of a Kelvin's double bridge for low resistance measurement. 8

#### OR

- 4 (a) Explain Price's guard-wire method for measurement at high resistance. 8
- (b) What are the difficulties associated with the measurement of low resistance? Explain the potentiometer method for the measurement of low resistance. 8

### UNIT - V

- 5 (a) Explain the working of Anderson bridge for self inductance measurement with proper phasor diagram. 8
- (b) Write short notes on Wagner earth device with suitable diagram. 8

#### OR

- 5 (a) Draw Wien's bridge and its phasor diagram for measurement of capacitance and frequency. Also obtain expression for frequency in terms of bridge parameters. 8
- (b) Discuss with phasor diagram the Heaviside's bridge for measurement of mutual inductance. 8