

Min. Passing Marks : 26

12/12

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)

NIL 1.

# UNIT - I

2. NIL

A bar of steel is 7 m long. First 2 m of it is 250 mm in diameter, next 3 m 1 of it 200 mm in diameter and remaining 2 m of it 150 mm in diameter. Find change in length if applied tensile load is 100 kN and  $E = 0.21 MN / mm^2$ .

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#### OR

Derive relation between Young's modulus of elasticity and Shear modulus 1 of elasticity.

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[ P.T.O.

3E1621 ]

# UNIT - II

At a point in web of girder, bending stress is 60 MPa tensile and shearing stress at same point is 30 MPa. Calculate principal stresses and maximum shear stress.

#### OR

Determine moment of inertia about centre of gravity XX for section shown below.



# UNIT - III

A hollow cast iron column, hinged at both ends is 4 m long. Its external diameter is 200 mm and internal diameter is 150 mm. Find maximum load it can carry if factor of safety is 4. Use Rankine's formula. Take  $\sigma_y = 550 N/mm^2$  and a = 1/1600.

## OR

Calculate minimum wall thickness of a thin cylinder 1 m in diameter, if it is to with stand internal pressure of  $2 N/mm^2$  and longitudinal stress is not. to exceed  $30 N/mm^2$  and also hoop stress not to exceed  $40 N/mm^2$ .

# UNIT - IV



#### OR

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3E1621

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Draw shear force and bending moment diagrams for beam shown below.

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[ P.T.O.

Draw SFD and BMD for beam shown below.



# UNIT - V

An R.S.J. 55 cm deep and 19 cm wide having flange and web thicknesses of 1.5 cm and 0.99 cm respectively is used as beam. Calculate moment of resistance at section where max. Stress is  $100 N/mm^2$ .



OR

5 For same section as fig. 4, if it is subjected to shear force of 100 kN, show variation of shear stress.

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3E1621 ]

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G		14/12
ſ		Roll No. : 3
14	452	3E1452
	3E1.	<ul> <li>B. Tech. (Sem. III) (Main) Examination, December - 2017</li> <li>Civil Engg.</li> <li>3CE2 Building Material &amp; Construction</li> </ul>

# 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.

1	Nil	2	Nil
1.		TIMU	

#### UNIT - I

1 (a) Explain the engineering characteristics of a good building stone.

(b) What are different tools required in the process of blasting and explain the process of blasting with neat sketches.

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#### OR

(a) Write a short note on different types of tiles.

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(b) Explain the operation of preparation of clay for the manufacture of bricks.

3E1452

# UNIT - II

(a) Write short notes on any two of the following :

(i) Consistency test of cement

(ii) Tensile strength of cement

(iii) Blaine's Air Permeability test on cement

(b) Explain the different types of lime and mention any five differences between fat lime and hydraulic lime.

2 (a) Write brief notes on : (i) Bulking of sand

(ii) Function of sand in Mortar

(b) Explain the burning process of cement with neat sketches.

UNIT - III

(a) What is 'plastic' and how are they classified and what are the civil engineering uses of plastic ?

(b) Write down the general properties of glass.

What are different tools require on the construction biasting and explain

- (a) Write short notes on any two of the following :
  - (i) Classification of glass.
  - (ii) Different types of varnish
  - (iii) Precast concrete
- (b) What is the objective of seasoning of wood and explain the different methods of artificial seasoning of wood.

3E1452

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# UNIT - IV

- (a) State the basic requirements that a building should satisfy for performing its basic function.
- (b) Write down any four differences between load bearing construction and framed structure construction.

### OR

- (a) What is the bearing capacity of soil ? Explain the various methods of improving the bearing capacity of soil.
- (b) State conditions suitable for the following type of foundation :
  - (i) Well foundation

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(ii) Pier foundation

#### 3+3

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#### UNIT - V

(a) What is the significance of bonding in brickwork ? Explain the four differences between English bond, Double Flemish bond and Single Flemish bond with neat sketches.

(b) Classify different types of Rubble masonry and describe in brief the construction of wall with coursed square rubble and dry rubble masonry.

#### OR

- (a) State the objective of plastering and name the various types of plasters and mention the requirement of good plaster.
- (b) Write brief notes on any two of the following :
  - (i) Concrete partition wall
  - (ii) Glass block partition wall
  - (iii) Different types of pointing.

# 3E1452 ]

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[ 400 ]

5 + 5

	Roll No		Total No. of Pages : 3
522		<b>3E1622</b>	
11	B. Tech. (Sem. III)	(Main/Back) Exami	nation, December - 2017
31	Civil Engg.		
	<b>3CE2A</b> Civil Engg.	. Materials	

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)

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1.

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#### Nil

# Nil

# UNIT - I

(a) List various methods used in quarrying the stones. Describe briefly the method of quarrying by blasting.

2.

(b) What are the various uses of stones ? Describe in detail.

#### OR

- 1 Write short notes on the followings :
  - (a) Water absorption test of stone.
  - (b) Selection of a site of a quarry.
  - (c) Advantages of quarry dressing of stone.
  - (d) Geological classification of rocks.

4×4=16

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## 3E1622 ]

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[ P.T.O.

- (a) Describe the process of burning of bricks in Hoffman's Kiln with the help of neat sketch.
  - (b) List out different type of tiles and describe briefly two of them with the help of neat sketches.

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 $4 \times 4 = 16$ 

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## OR

- 2 (a) List out the different tests of bricks. Describe any one test in detail.
  - (b) Explain various constituents of good brick clay.

# UNIT - III

3 (a) List various types of cements; State briefly the application of each type. 8

(b) Explain the classification of limes in detail.

#### OR

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3 Differentiate between the followings :

(a) Initial setting time and Final setting time of cement

- (b) Cement and Lime
- (c) White cement and Ordinary cement
- (d) Quick lime and Slaked lime.

### 3E1622 ]

# UNIT - IV

(a)

What is mortar? List various types of mortar. Explain the method for preparing the cement mortar.

(b) Explain the process of natural seasoning of timber. Mention its advantages and disadvantages.

## OR

- (a) Explain the various types of paints and varnishes and their application in detail.
   8
- (b) Differentiate between the followings :
  - (i) Cup shakes and Star shakes defects of timber
  - (ii) White wash and Distempers.

## UNIT - V

(a) Write short note on natural materials like bamboo, rammed earth, stabilized block.

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 $2 \times 4 = 8$ 

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(b) Explain building material from agro and industrial wastes.

#### OR

5 Write short notes on the following :

- (i) Plastic
- (ii) Glass
- (iii) Silica fume
- (iv) Rice husk ash.

## 3E1622 ]

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 $4 \times 4 = 16$ 

16/12

	Roll No		Total No. of Pages : 3
623		3E1623	
11	B. Tech. (Sem. III) (Mai	n/Back) Exam	ination, December - 2017
	Civil Engg.	•	
	3CE3A Engg. Geology		

Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 26

Nil

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)

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# UNIT - I

2.

1 Distinguish between weathering and Erosion and describe in brief various agents of weathering.

OR

Write short notes on any two of the following :(i) Features formed by wind deposits.

(ii) Features formed by river erosion.

Nil

(iii) Various Physical properties of minerals.

3E1623 ]

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# UNIT - II

- Describe in brief about the various geological and engineering properties of Rocks. that are important in selection of rocsks.
  - (a) As building material

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(b) As road aggregates.

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## OR

Write short notes on any two of the following :

- (i) Mineralogical classification of igneous rocks.
- (ii) Structures of sedimentary rocks.
- (iii) Agents of Metamorphism.

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# UNIT - III

3 Distinguish between joints and Faults. Write in brief about the classification of faults and illustrate your answer with diagrams.

#### OR

- 3 Write short notes on any two of the following :
  - (i) Define unconformity and describe different types of unconformities.

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2+6=8

[ P.T.O.

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2+14=16

8+8=16

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(ii) Describe various types of joints.

(iii) How are faults recognised in the field ?

# 3E1623 ]

Describe in brief about the various geological, geophysical and other investigations which need to be carried out in selection of a site for dam and Reservoir.

OR

Describe in brief geophysical electrical resistivity methods and their uses in Civil engineering.

UNIT - V

Define remote sensing and describe advantages and limitation of remote sensing and G.I.S. in different fields of civil engineering.

2+7+7=16

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## OR

Write short notes on any two of the following :

(i) Describe in brief about the different types of platforms used in remote sensing.

(ii) Define sensors and write in brief about the characteristics of sensors.

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(iii) Describe in brief E.M.R. and Electromagnetic spectrum.

4+4=8

2+6=8

3E1623 ]

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	Roll No. : Total Printed Pages : 4
014	<b>3E2014</b>
3E2	B. Tech. (Sem. III) (Back) Examination, December 2017 Civil Engg.
	3CE4(O) Computer Applications in Civil Engg.

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

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19/12

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) If  $R = 10x^3y^2z^2$  and errors in x, y, z are 0.03, 0.01, 0.02 respectively at x = 3, y = 1; z = 2. Calculate absolute error and percentage relative error in evaluating R.
  - (b) Perform two iteration of the Bairstow method to extract a quadratic factor  $x^2 + px + q$  from the polynomial

$$P_3(x) = x^3 + x^2 - x + 2 = 0$$

Starting with  $P_o = -0.9$ ; and  $q_o = 0.9$ .

OR

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3E2014 |

- (a) Compare the various methods for finding roots of a non-linear equations in respect of the relative merits and limitation.
  - (b) Write the algorithm for finding the roots of the equation  $\cos x = 3x 1$  using iteration method.

## UNIT - II

- 2 (a) Write the algorithm for Gauss-Seidal method for solving linear equations.
  - (b) Use factorization method to solve the following system : x + 2y + z = 4; 2x - 3y - z = -3; 3x + y + 2z = 3.

#### OR

(a) Solve by Gauss-seidal method upto third iteration

27x + 6y - z = 85 6x + 15y + 2z = 72x + y + 54z = 110

(b) Why pivoting required in Gauss elimination method ? Differentiate between partial and full pivoting.

#### UNIT - III

(a) Explain the method of least square for fitting a second degree parabola and use it to fit a second degree parabola to the following data :

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

Find the difference between the actual value of y and the value of y obtained from the fitted curve when x = 2.

b) Solve 
$$y_{n+2} + y_{n+1} + y_n = n^2 + n + 1$$
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OR

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(a) Prove that 
$$\mu^2 = 1 + \frac{\delta^2}{4}$$

(b) Evaluate  $\Delta^2(\cos 2x)$ .

(c) The ordinates of the normal curve are given by the following data :

x	0	0.2	0.4	0.6	0.8
У	0.3989	0.3910	0.3683	0.3332	0 2807

Then calculate y(0.25); y(0.46) and y(0.62).

## UNIT - IV

(a)

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What is the use of "numerical integration" to find area of a curve.

- (b) Using Simpson's  $\frac{1}{3}$  rule numerically integrate the function as given below from x = 1 to x = 3 (use 2 step calculation)  $y = 2e^x 5x^2 + 7$ .
  - OR

(a) Use trapezoidal rule, Simpson's  $\frac{1}{3}$  rule and Simpson's  $\frac{3}{8}$  rule of

numerical integration to evaluate  $\int_{4}^{5.2} \log_e x \, dx$  and compare the errors in all cases with actual value.

(b) Write the algorithm of Simpson's  $\frac{3}{8}$  rule for a known function.

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Use Runge-Kutta fourth order method to solve  $\frac{dy^3}{dx} = -2xy^2$ ; y(o) = 1; (a)

h = 0.2 for x = 0.2 and x = 0.4.

and gowelled of the normal entries are given by the fallowing data Solve the equation  $U_{xx} + U_{yy} = 0$  for the following square mesh with (b) the given boundary conditions :



neig as among of present vior and an - starsgard, gold by Write an algorithm an Euler's method to find out solution of differential (a) (1)

Solve the Poisson equation  $\nabla^2 u = -10(x^2 + y^2 + 10)$  over the square (b) with sides x = 0; y = 0; x = 3; y = 3; with u = 0 on the boundary and mesh length = 1.

in all cases with actual value.

(b) Write the algorithm of Shapson's

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role for a known broches

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4	Roll No.	Total N	No. of Pages : 3
62		3E1624	
3E1	B. Tech. (Sem. III) (Main Civil Engg.	/ Back) Examination, Dec	ember - 2017
	<b>3CE4A</b> Construction Tech	inology	

Maximum Marks : 80 Min. Passing Marks : 26

Nil

19/12

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 materials is permitted during examination. (Mentioned in form No. 205)

Nil

2.

# UNIT - I

- (a) What is a building ? What are the components of a building ? Explain in detail.
- (b) What do you understand by Pre-cast structures ? What are the advantages and disadvantages of Pre-cast structure ?

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3E1624 ]

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[ P.T.O.

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- (a) Define scaffolding ? What are the components of scaffolding ? Explain any two types of scaffolding with neat diagram.
  - (b) What is the significance of providing foundation to the building ? Explain designing criteria for width of a shallow foundation.

# UNIT - II

- 2 (a) Enumerate the structural components of an arch with neat diagram. Explain pointed arch and Florentine arch.
  - (b) Explain the various technical terms used in case of stair with neat diagram.

#### OR

- (a) Define the general principles to be considered in case of damp proofing. Explain air drain and asphalt tanking methods of damp proofing with diagram.
  - (b) What is the purpose of providing a partition wall ? Explain brick-nogged partition and stud partition with diagram.

## UNIT - III

- 3 (a) Explain the precautions to be taken during the erection of steel structures at the slopes.
  - (b) What is a composite floor ? What are the features of a composite floor ? Explain the construction mechanism of jack arch floor.

#### OR

3 (a) Explain following with diagram of a pitched roof -

- (i) Battens
- (ii) Dragon Beam
- (iii) Purlins
- (iv) Rafters

(b) Describe at least four types of pitched roof with diagram.

#### 3E1624

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[ **P.T.O**.

 $2 \times 4 = 8$ 

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# UNIT - IV

(a) Explain following -

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- (i) Dewatering equipments
- (ii) Grouting equipments
- (iii) Pile driving equipments
- (iv) Compaction equipments
- (b) Explain the functioning of Asphalt batch hot mix plant.

#### OR

- (a) What are the pumping equipments ? Explain their functioning in detail.
- (b) How the latest innovations in construction equipments has affected the working of construction industry ? Explain.

### UNIT - V

(a) How would you explain forecasting of equipments ? Explain briefly.

#### (b) Explain following -

- (i) Owning cost
- (ii) Investment cost
- (iii) Overhead cost
- (iv) Operation cost
- (v) Depreciation

#### OR

(a) Explain break-even point theory with major concern of determination of break-even point value.

(b) What is preventive maintenance ? What are its functions ? Explain.

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 $2.5 \times 4 = 10$ 

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 $2 \times 5 = 10$ 

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21/12



Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 26

Nil

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 materials is permitted during examination.

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1.

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Nil

#### 2.

## UNIT - I

- (a) Enunciate Newton's law of viscosity. Explain the importance of viscosity in fluid motion. What is the effect of temperature on viscosity of water and that of air ?
  - (b) The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm.

OR

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3E1625

[ P.T.O.

(a) Write short notes on any four :

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- (i) Specific weight, Specific volume and Specific gravity.
- (ii) Compressibility and Bulk modulus of compressibility.
- (iii) Surface tension and capillarity.
- (iv) Vapour pressure and cavitations.
- (v) Different types of fluids.

 $4 \times 4 = 16$ 

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### UNIT - II

- (a) Explain the different types of measurement of pressure in Fluid with neat sketch. Also give the expression for pressure in inclined single column manometer.
  - (b) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of sp. gr. 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere, Find the vacuum-pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left from the centre of pipe is 15 cm below.

#### OR

- (a) What is meta-centre ? Explain the analytical method of determination of meta-centric height.
  - (b) A uniform body of size 3 m long x 2 m wide x 1 m deep floats in water. What is the weight of the body if depth of immersion is 0.8 m? Determine the meta-centric height also.

UNIT - III

- 3 (a) Determine the equation of motion by Euler's equation of motion. Also explain Bernoulli's equation from Euler's equation. Give all the assumptions made in Bernoulli's equation.
  - (b) A pipe, through which water is flowing, is having diameters, 20 cm and 10 cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given 4.0 m/s. Find the velocity at sections 1 and 2; also rate of discharge.

OR

3E1625 ]

**P.T.O.** 

(a) Explain velocity potential function and stream function.

(b) The velocity potential function  $(\phi)$  is given by an expression

$$\phi = -\frac{xy^3}{3} - x^2 + \frac{yx^3}{3} + y^2$$

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- (i) Find the velocity components in x and y direction
- (ii) Show that  $\phi$  represents a possible case of flow.

UNIT - IV

- (a) What are the different applications of Bernoulli's equation ? Give the expression for rate of flow through venturimeter.
- (b) An oil of sp.gr. 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take  $C_d = 0.98$ .

#### OR

- (a) Give the classification of Notches and weirs. Find the discharge over a triangular notch and stepped notch.
- (b) Find the discharge through the notch for given figure, if  $C_d$  for all section = 0.62.



Figure

#### 3E1625

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- What are the different losses of energy in pipes? Derive Chezy's formula for loss of head due to friction in pipes.
- Find the head lost due to friction in a pipe of diameter 300 mm and length (b) 50 m, through which water is flowing at a velocity of 3 m/s using (i) Darcy's formula (ii) Chezy's formula for which C = 60, kinematic viscosity for water is 0.01 stoke.

#### OR

- Find an expression for the power transmission through pipes. What is the (a) condition for maximum transmission of power and corresponding efficiency of transmission ?
- A pipe of diameter 300 mm and length 3500 m is used for the transmission (b) of power by water. The total head at the inlet of the pipe is 500 m. Find the maximum power available at the outlet of the pipe, if the value of f = 0.06.

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(a)

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	Roll No.	Total No. of Page	s : 4
20		3E1626	
16	B. Tech. (Sem. III) (	Main/Back) Examination, December - 20	017
	Civil Engg.		
3	<b>3CE6A</b> Advanced E	ngg. Mathematics	

Maximum Marks : 80 Min. Passing Marks : 26

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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)

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1.

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# \_\_\_\_ 2. \_\_\_

# Nil

## UNIT - I

(a) Find the Fourier series to represent  $x - x^2$  from  $x = -\pi$  to  $x = \pi$ . Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$$

Nil

- (b) Find the Z-transform of
  - (i)  $\sin \theta$
  - (ii)  $c^n \cos n\theta$

OR 1

3E1626 ]

[ P.T.O.

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(a) Find the inverse z-transform of  $\frac{z^3 - 20z}{(z-2)^3(z-4)}$ .

(b) Analyse Harmonically the data given below and express y in Fourier series up to third harmonic :

<i>x</i> :	0	π/3	$2\pi/3$	π	$4\pi/3$	$5\pi/3$	2π
<i>y</i> :	1.0	1.4	1.9	1.7	1.5	1.2	1.0

# UNIT - II

2 (a) Find Laplace transform of  $f(t) = \frac{1 - \cos 2t}{t}$ . Also calculate the integral  $\int_{0}^{\infty} e^{-t} \frac{\sin^{2} t}{t} dt$ (b) Solve  $(D^{2} - D - 2)x = 20\sin 2t$ , x(0) = -1, x'(0) = 2.

#### OR

(a) Apply convolution theorem and evaluate inverse Laplace transform of  $\frac{s^2}{(s^2 + a^2)(s^2 + b^2)}$ 

(b) Solve  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$  where 0 < x < 1, t > 0 together with the conditions  $u(x, 0) = 3\sin 2\pi x$ , u(0, t) = 0, u(1, t) = 0.

## UNIT - III

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3 (a) Find the Fourier transform of f(x), where  $f(x)\begin{cases} 1-x^2, & |x|<1\\ 0, & |x|>1 \end{cases}$ 

and hence evaluate  $\int_0^\infty \left(\frac{x\cos x - \sin x}{x^3}\right) \cos\left(\frac{x}{2}\right) dx$ .

3E1626

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(b) Solve f(x) the integral equation

$$\int_0^\infty f(x)\cos(sx)\,dx = \begin{cases} 1-s &, \ 0 \le s \le \\ 0 &, \ s > 1 \end{cases}$$
  
Hence prove that 
$$\int_0^\infty \frac{\sin^2 t}{t^2}\,dt = \pi/2$$

(a) Find Fourier cosine transform of  $\frac{1}{1+x^2}$ .

(b) Solve  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ , x > 0, t > 0 subject to the conditions : (i) u(0, t) = 0(ii)  $u = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \ge 1 \end{cases}$ , when t = 0

(iii) u(x, t) is bounded.

(a) Prove that

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(i) 
$$\Delta = \frac{1}{2} \delta^2 + \delta \sqrt{1 + \frac{1}{4} \delta^2}$$

(ii) 
$$e^x = \left(\frac{\Delta^2}{E}\right) e^x \cdot \frac{Ee^x}{\Delta^2 e^x}, h = 1$$

(b) Using Newton's forward interpolation formula, find y at x = 8 from the following table :

OR

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<i>x</i> :	0	5	10	15	20	25
<i>y</i> :	7	11	14	18	24	32

3E1626 ]

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(a) Using Lagrange's interpolation formula, find the value of y at x = 10 from the following table :

<i>x</i> :	5	6	9	11
<i>y</i> :	12	13	14	16

(b) Evaluate 
$$\int_0^1 \frac{1}{1+x^2} dx$$
 by using :

- (i) Simpson's  $\frac{1}{3}$  rule
- (ii) Simpson's  $\frac{3}{8}$  rule.

Also find approximate value of  $\pi$ .

# UNIT - V

(a) Apply Picard method to find solution of differential equation  $\frac{dy}{dx} = 1 + y^2$  and y(0) = 0 up to fourth order.

(b) Given  $\frac{dy}{dx} = x^2(1+y)$  and y(1) = 1 then calculate y(1.4) by Milne's PC method.

#### OR

- 5 (a) Given  $\frac{dy}{dx} = x^2 y$ , y(0) = 1. Find y(0.2) by Runge-Kutta Fourth order method.
  - (b) Given that  $\frac{dy}{dx} = x + y^2$  and y = 1 at x = 0. Find an approximate value of y at x = 0.4 by modified Euler's method.

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Roll No	Total No. of Pages : 4
	3E1651
B. Tech. (Sem. III) (Me	rcy Back) Examination, December - 2017
Computer Sc. & Engg. 3CS1A Electronic Devi	ces & Circuits
	Roll No B. Tech. (Sem. III) (Me Computer Sc. & Engg. 3CS1A Electronic Devi

Maximum Marks : 80

Min. Passing Marks : 24

Nil

14/12

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 by assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

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

1.

# UNIT - I

2.

1 (a) Calculate the current in diode (silicon) circuit shown in fig. 1.





1

(b) Define following :

(i) Mobility and

(ii) Mass action law

Nil

# 3E1651 ]

3×2=6 [ P.T.O.

(c) If a silicon sample has  $10^{15}$  boron/cm<sup>3</sup> then calculate the no. of holes and electron density in it. Assume intrinsic concentration is  $n_i = 1.5 \times 10^{10} / \text{cm}^3$ .

#### OR

- (a) Draw and define diode load line. Also define the load line under AC conditions.
- (b) Find the expression for Hall coefficient and explain the application of Hall effects.
- (c) Define Fermi level in semiconductor material.

## UNIT - II

- (a) If  $\alpha = 0.8$  then find the value of common emitter and common collector current gain.
  - (b) Define following :
    - (i) Thermal runaway
    - (ii) Stabilization and
    - (iii) Compensation
    - (c) Write interrelation between h-parameter of CE and CB.

## OR

- 2 (a) Draw circuit of fixed bias and define its stability factor.
  - (b) Draw Eber's Null model and explain its working for CE configuration.
  - (c) Write the units of all h-parameters.

#### 3E1651 ]

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 $2 \times 2 = 4$ 

3×3=9

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# UNIT - III

- (a) Draw the frequency response of an RC coupled amplifier and mention on it (i) 3-dB cut off frequencies (ii) Bandwidth.
  - (b) Find the voltage gain for common source configuration if  $\mu = 10^{-3}$  and

 $g = 10^{-5}$  then calculate the voltage gain for a load  $R_C = 10 k\Omega$ .

#### OR

- (a) Define Miller's theorem and its dual. How this theorem is useful in solving amplifier circuits ?
  - (b) Why common collector is called "emitter follower"? Draw its circuit and find the expression for voltage gain.

## UNIT - IV

(a) Define following :

- (i) Forward voltage gain
- (ii) Gain with feedback
- (iii) Feedback factor and
- (iv) Stability factor of feedback amplifier.

#### $4 \times 2 = 8$

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(b) If  $R_i = 10 k\Omega$  and  $A_i = 100$  then find  $R_{if}$  and  $A_{if}$  in (i) voltage shunt and (ii) voltage series feedback.

 $4 \times 2 = 8$ 

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- (a) What is current shunt feedback ? How it modifies input and output resistance of an amplifier ?
  - (b) Find the relation between  $R_i$  and  $R_{if}$  for
    - (i) Current series feedback and
    - (ii) Voltage shunt feedback.

# UNIT - V

- (a) Draw the circuit of Colpitt oscillator and find its oscillation frequency when  $C_1 = C_2 = 10 \,\mu F$  and  $L = 2n\mu$ .
  - (b) Draw the electrical equivalent circuit of crystal oscillator. Also find the expression for its series and parallel resonant frequencies.

#### OR

- (a) Design Wein bridge oscillator for generating a signal at 1.5 kHz.
  - (b) Draw astable multivibrator circuit diagram and explain its working for generate clock.

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 $4 \times 2 = 8$ 

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7	Roll No		Total No. of Pages : 3
161		3E1652-1612	
5-	B. Tech. (Sem. III) (Main / Back) Examination, December - 2017		
16	Computer Sc. & E	ngineering	
E	<b>3CS2A Data Structur</b>	es and Algorithms	
<b>G</b> 3	CS, IT, EX, EC, EI		

Maximum Marks : 80 Min. Passing Marks : 26

16/12

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 materials is permitted during examination. (Mentioned in form No. 205)

1.	Nil	2	NII
	- 1	<b>4</b> .	

## UNIT - I

1 (a) Define algorithm. What do you understand by best, worst and average case analysis of an algorithm.

(b) Using suitable example explain row major and column major form of array.

OR

- (a) Explain the difficulties in estimating exact execution time of Algorithms.
- (b) Explain Asymptotic notations : Big-Oh, theta, Omega using suitable example.

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3E1652-1612 ]

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# UNIT - II

(a) Define the concept of recursion using stack using suitable examples. What are the difficulties in dealing with infix expression ?

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- (b) Convert following expressions in its equivalent postfix expressions.
  (i) A\*(B+C\*D)+E
  - (ii)  $A * B^{\wedge}C + D$

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#### OR

- (a) Explain tower of Hanoi problem. Explain using suitable diagram and example.
  - (b) Explain transposition of sparse matrices with algorithms of varying complexity.

## UNIT - III

- 3 (a) Compare binary search and sequential search.
  - (b) Using suitable diagram explain the concept of Head Node in linked lists.

#### OR

3 (a) Write the algorithm for insertion and deletion in doubly and circularly connected linear linked lists.

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(b) Write down the following polynomial.

 $3x^4 - 2x^2 + 9x - 11$  by a linked list.

## 3E1652-1612 ]

# UNIT - IV

- (a) Define the concept of balanced trees. Write pseudo code for insertion into and deletion from AVL tree.
  - (b) Define the different applications of trees for representation of sets.

#### OR

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(a) Define the following binary tree

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- (i) Complete binary tree.
- (ii) Strictly binary tree.
- (b) Write an algorithm for inorder travesal of a threaded binary tree.

# UNIT - V

- (a) Compare Internal sorting and External sorting.
  - (b) By taking suitable example explain the principle of operation of heap sort.
  - (c) Prove that Heap sort, Merge sort and Quick sort takes  $\Omega(n \log n)$  tie in the worst case. 8

#### OR

5 Write short notes on following : (a) DFS traversal Algorithms

(b) Comparison of sorting Algorithms in terms of time complexity.

3E1652-1612 ]

	<u>CS</u>	.12/12
	Roll No	Total No. of Pages : 3
54	<b>3E16</b>	54
9	B. Tech. (Sem. III) (Main / Back) E	xamination, December - 2017
3H	Computer Sc. & Engg. 3CS4A Object Oriented Programmi	ng
	EE,EX,CS,IT	

Maximum Marks : 80 Min. Passing Marks : 26

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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

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

OR

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

3E1654 ]

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# UNIT - II

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

#### OR

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

# UNIT - III

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

#### OR

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

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## UNIT - IV

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

#### OR

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

## 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 ?
  - (b) Write short note on Templates.
    - OR
- 5 (a) Explain the effect of using the access specifiers with class members on inheritance.

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(b) Write short note on exception handling.

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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)

			A set year		
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*	22	*			···

## UNIT - I

- (a) What is Permissions ? How can we apply permissions for the files and directories ?
  - (b) Explain the linux file system architecture with the help of its diagram.

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#### OR

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3E1655 ]

Explain the following commands with their syntax and examples :

	(ii) stty
(111) Is - IR	(iv) chmodx
(V) mount -v-o	(vi) In
(VII) gcc -o prog.c	(viii) touch
	age 1 2 . no tetraphia

# (244) Cher, and Shih Programming UNIT - II

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16

- (a) Explain the programming utility in linux file system. 2 selence way five questions, selecting and question "new even what
  - All Quernans carro regual igoria. Scheman How can we use the debugging C programs using gdb ? (b) assumed and stated clearly. Drais of quantities used in infantated,

#### OR

- (a) What is exrc file for different setting parameters ? Explain.
- (b) Describe the advance editing techniques.

# UNIT - III

What do you mean by X ? Explain different components of X and also describe 3 the X-clients location of the second statements at today

#### OR

3 Write short notes on the following :

Alin Pateing Marks :

(i) xinitrc file

Concept of window manager. (ii)

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## UNIT - IV

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- What is redirection ? Explain input output and error redirection. (a)
- (b) Write short notes on :
  - Types of shell (i)
  - (ii) Command line editing

#### $4 \times 2 = 8$

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## OR

(a) What do you mean by directory stack manipulation ? Explain.

- (b) Write short notes on :
  - Variables and keywords (i)
  - (ii) Piping process

 $4 \times 2 = 8$ 

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## UNIT - V

- (a) What is the Here document ? Explain. 5
  - Write a shell script to generate the factorial of N numbers using through (b) keyboard.

#### OR

- 5 Explain the following terms :
  - Aliases (i)
- (ii) Source code management
- (iii) awk utility
- (iv) NULL or USET variables.

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**Time : 3 Hours** 

Maximum Marks : 80 Min. Passing Marks : 26

Nil

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 materials is permitted during examination. (Mentioned in form No. 205)

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	N + 1		
		/	
		<u> </u>	

## UNIT - I

1 (a) Define optimization techniques and write its various engineering applications

OR

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(b) Solve the problem by constrained variation method.

Min

 $f(X) = \frac{1}{2} \left( x_1^2 + x_2^2 + x_3^2 \right)$ 

Sub. to

to  $g_1(X) = x_1 = x_2$  $g_2(X) = x_1 + x_2 + x_3 = 1$ 

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(a) Optimize  $Z = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$ , Subject to  $x_1 + x_2 + x_3 = 15$ ,  $2x_1 - x_2 + 2x_3 = 20$ ,  $x_1, x_2, x_3 \ge 0$ 

(b) Maximum  $Z = 2x_1 + 3x_2 - (x_1^2 + x_2^2 + x_3^2)$ Subject to  $x_1 + x_2 \le 1$ ,  $2x_1 + 3x_2 \le 6$ ,  $x_1, x_2 \ge 0$ 

## UNIT - II

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[ P.T.O.

- (a) A firm manufacturing two types of electric items, A and B can make a profit of Rs. 20 per unit of A and Rs. 30 per unit of B. Each unit of A requires 3 motors and 4 transformers and each unit of B requires 2 and 4 respectively. The supply of these per month is 210 and 300 respectively. Type B requires a stabilizer with supply of 65 units per month. Formulate the LPP for maximum profit and solve it graphically.
  - (b) User two-phase method to solve : Min  $Z = x_1 + x_2$ , Subject to  $2x_1 + x_2 \ge 4$ ,  $x_1 + 7x_2 \ge 7$ and  $x_1, x_2 \ge 0$

#### OR

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2 (a) Find the dual of the problem Min  $Z = 2x_2 + 5x_3$ Subject to  $x_1 + x_2 \ge 2$ ,  $2x_1 + x_2 + 6x_3 = 6$ ,  $x_1 - x_2 + 3x_3 \le 4$ and  $x_1, x_2, x_3 \ge 0$ 

3E1656 |

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# UNIT - IV

(a) Find inverse L-transform of function of  $\frac{s}{s^4 + 4a^4}$ .

(b) Find the bounded solution u(x,t), 0 < x < 1, t > 0 of the boundary value problem  $\frac{\partial u}{\partial x} - \frac{\partial u}{\partial t} = 1 - e^{-t}, u(x, 0) = x.$ 

#### OR

- (a) Find Laplace transform of  $\sin \sqrt{t}$  and deduce  $L\left[\frac{\cos \sqrt{t}}{\sqrt{t}}\right] = \sqrt{\frac{\pi}{s}}e^{-\frac{1}{4s}}$ 
  - (b) Solve  $\frac{d^2y}{dt^2} 3\frac{dy}{dt} + 2y = 1 e^{2t}$ ; y(0) = 1; y'(0) = 0.

#### UNIT - V

(a) The population of a country is the decimal census were as under; estimate the population for the year 1925.

Year(X)	1891	1901	1911	1921	1931
Population (in thousands) $f(x)$	46	66	81	93	101

(b) Evalute  $\int_{0}^{1} \frac{1}{1+x^2} dx$  by Simpson's  $\frac{1}{3}$  and  $\frac{3}{8}$  rule. Hence obtain the

approximate value of  $\pi$  in each case.

#### OR

5 (a) Given  $2\frac{dy}{dx} = (1+x^2)y^2$  and y(0) = 1, evaluate y(0.4) by Milne's Prodictor-corrector method.

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(b) Solve 
$$y_{n+2} + y_{n+1} + y_n = n^2 + n + 1$$
.

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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 materials is permitted during examination. (Mentioned in form No. 205)

1 (a) Find Laplace transform of the function  $\sin \sqrt{x}$  and hence or otherwise obtain

Laplace transform of  $\frac{\cos\sqrt{x}}{\sqrt{x}}$ .

(b) Find the inverse Laplace transform of 
$$\log \sqrt{1 + \frac{9}{s^2}}$$

## OR Use Laplace transform theory to solve the following equation :

1 (a)

$$(D^2 + 1)y = x \cos x$$
, where  $y = 0$ ,  $\frac{dy}{dx} = 0$  at  $x = 0$ .

(b) State and prove convolution theorem for Laplace transform.

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## UNIT - II

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(a) Obtain the Fourier series of the function  $f(x) = x - x^2$ ,  $-\pi < x \le \pi$  and deduce that Tera. (Semi-121) (Main/Back) Examination, F  $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ 

(b) In the Z transform, show that  $Z\left\{n^p\right\} = -z \frac{d}{dz} Z\left\{n^{p-1}\right\}$ , and hence evaluate  $Z\left\{n^3\right\}$ .

# coloniated must be marent etrar OR 8 (a) If $f(x) = \begin{cases} x & 0 \le x \le \pi/2 \\ \pi - x, & \pi/2 < x \le \pi \end{cases}$ , then find half range cosine series 2 of f(x).

(b) Using convolution theorem, find the inverse Z transform of  $\frac{z^2}{(z^2 - 4z + 3)}$ .

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# UNIT - III

(a) Find the Fourier transform of  $f(x) = \begin{cases} 1 - x^2, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$ . Hence evaluate 3

> the integral  $\int_{-\infty}^{\infty} \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx$ . (i) State and prove convolution freeren for Laplace transform

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(b) Using Fourier transform, find the solution of the initial boundary value problem.

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$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}, -\infty < x < \infty, t > 0$$
$$u(x, 0) = f(x), u(x, t) \text{ is finite as } x \to \pm\infty$$

#### OR

(a) Find the Fourier sine and cosine transform of the function  $x^{m-1}$ .

(b) Find 
$$f(x)$$
, if its Fourier sine transform is,  $\frac{p}{(1+p)^2}$ .  
UNIT - IV

(a) If f(z) = u + iv is an analytic function of z = x + i y and

 $u - v = \frac{\cos x + \sin x - e^{-y}}{2\cos x - e^{y} - e^{-y}}$  then, find u and v and the corresponding analytic function f(z).

(b) Find the bilinear transformation which maps the points  $z = \infty$ , *i*, 0 into the points w = 0, *i*,  $\infty$ .

(b) Prove that 
$$\int_C \frac{dz}{(z-a)} = 2\pi i$$
, where C is given by the equation  $|z-a| = R$ .

#### OR

(a) Show that the function 
$$f(z) = u + iv$$
, where

$$f(z) = \frac{x^2 y^5 (x + iy)}{x^4 + y^{10}}, \ z \neq 0, \ f(0) = 0$$

is not analytic at the origin although Cauchy Riemann equations are satisfied at the origin.

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# UNIT - II

(a) Obtain the Fourier series of the function  $f(x) = x - x^2$ ,  $-\pi < x \le \pi$  and deduce that monor , and the firmer's there is an inclusion from the  $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$ 

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(b) In the Z transform, show that  $Z\left\{n^p\right\} = -z \frac{d}{dz} Z\left\{n^{p-1}\right\}$ , and hence es. evaluate  $Z\left\{n^3\right\}$ . geori cach whit

en printe in parties (a) If  $f(x) = \begin{cases} x & 0 \le x \le \pi/2 \\ \pi - x, & \pi/2 < x \le \pi \end{cases}$ , then find half range cosine series 2 of f(x).

(b) Using convolution theorem, find the inverse Z transform of  $\frac{z^2}{(z^2-4z+3)}$ .

# UNIT - III

and working & spread of the state of (1)

Find the Fourier transform of  $f(x) = \begin{cases} 1 - x^2, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$ . Hence evaluate 3 (a)

the integral 
$$\int_{0}^{0} \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx$$

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- (b) Evaluate the integral  $\int_C \frac{e^{2z} dz}{(z+a)^4}$ , where C is the circle |z| = 3.
- Show that function  $u = \cos x \cosh y$  is harmonic and find its harmonic (c)

(a) Expand  $f(z) = \frac{1}{(z-1)(z-3)}$  in the power of z which are valid for 5 regions: (i) |z| < 1(ii) 1 < |z| < 3 to according to the second seco (iii) |z| > 3

(b) Use method of contour integration to prove that  

$$\int_{0}^{2\pi} \frac{d\theta}{1+a^2-2a\cos\theta} = \frac{2\pi}{1-a^2}; \ 0 < a < 1..$$

(a) Find the residues of  $\frac{z^2}{(z-1)(z-2)(z-3)}$  at z = 1, 2, 3 and  $\infty$ , and show

in a second second second second second

Use method of contour integration to evaluate  $\int_{0}^{\infty} \frac{\cos mx}{a^2 + x^2} dx.$ (b) et the preparation is allely kremanicque (one are resisfied

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	Roll No Total No. of Pages :
3E1641	<b>3E1641</b> R. Tech. (Sem. III) (Main/Back) Examination, December - 2017
	Applied Elect. & Inst. Engg.
<b>G</b>	3A12 Electronic Devices & Circuits (EC, EIC, EE, EX, AI,

14/12

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)

Nil \_\_\_\_\_ 2. \_\_\_\_\_Nil

## UNIT - I

1 (a)

1.

What is the position of the fermi level in an intrinsic semiconductor? How does its position change when :

(i) donor and

(ii) acceptors are added to the semiconductor ?

## 3E1641 ]

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- (b) A sample of Ge is doped to the extent of  $10^{14}$  donor atoms/cm<sup>3</sup> and  $5 \times 10^{13}$ acceptor atoms/cm<sup>3</sup> at 300 K, the resistivity of intrinsic Ge is  $60 \Omega - cm$ . If the applied electric field is 2 V/cm, find the total conduction current density. Assume  $\mu_p/\mu_n = 1/2$  and  $n_i = 2.5 \times 10^{13} / cm^3$  at 300 K.
- What is mass action for the carrier concentration ? (c)

  - What are "Hall effect" and "Hall field" ? Explain briefly the physical origin
- A rectangular semiconductor specimen, 2 mm wide and 1 mm thick, gives (b) a Hall coefficient of  $10^{-2}$  m<sup>3</sup>/c. When a current of 1 mA is passed through the sample, a Hall voltage of 1 mV is developed find the magnetic field

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# UNIT - II

2

(a)

1

(a)

In the circuit of figure the Zener diode is non ideal, having a knee voltage  $V_{zo} = 9V$  and a dynamic resistance  $r_z = 5\Omega$ . If the supply voltage  $V_s$  varies from 15 to 30V, determine the range of variation of the output voltage  $V_0$ ,



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3E1641 |

- (b) (i) What is unijunction transistor ? Give the equivalent circuit.
  - (ii) Draw and explain its current voltage characteristics.

#### OR

(a) The voltage waveform  $v_i$  of Figure (a) is applied to the input of the circuit of Figure (b). Show the output voltage  $V_0$  waveform and mark the voltage levels.



Find the PIV of the diode, assumed to be ideal.

(b) Draw the circuit diagram of a fullwave voltage doubler and explain its operation, how can we construct a voltage trippler ?

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## UNIT - III

- (a) Draw the circuit diagram of an emitter follower. Why it is called an emitter follower ? Obtain expression for the current gain, input resistance voltage gain and output resistance.
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OR

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(a) In the circuit of figure shown below,  $\beta = 99$  and  $V_{BE} = 0.7V$ . Calculate the quiescent values of  $I_B$ ,  $I_C$ ,  $I_E$  and  $V_{CE}$ . If  $\beta$  is increases by 20% what is the corresponding change in  $I_C$ ?

$$Re = 4k\Omega$$

$$Re = 7k\Omega$$

$$R_{E} = 7k\Omega$$

$$R_{E} = 5k\Omega, R_{E} = 7k\Omega$$

$$R_{C} = 4k\Omega$$

$$R_{C} = 4k\Omega$$

$$V_{CC} = +15V$$

$$V_{EE} = -15V$$

$$V_{EE} = -15V$$

3E1641 ]

(b) Draw and label the low frequency h-equivalent of CE amplifier and obtain voltage gain.

## UNIT - IV

- (a) Derive an expression for the small signal voltage gain of a common source FET amplifier.
  - (b) A n-channel JFET has  $I_{DSS} = 12$  mA and Pinch off voltage  $V_P = -4V$ . Find the drain current for  $V_{GS} = -2V$ . If the transconductance  $g_{mo}$  of a JFET with the same  $I_{DSS}$  at  $V_{GS} = 0$  is 4 millimho, find the pinch off voltage.

#### OR

(a) Sketch the structure of n-channel depletion type MOSFET. Explain how the depletion region is produced in the channel. Can a depletion MOSFET work in the enhancement mode ?

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(b) An n-channel enhancement mode MOSFET, biased as shown in Fig. operates -1in the active region. The given parameters are  $V_T = 2V$  and

 $K = 0.5 \text{ mA/V}^2$ . Calculate  $I_D$ ,  $V_{GS}$  and  $V_{DS}$  verify that the operation is indeed in the active region.



UNIT - V

- (a) An RC coupled amplifier employs two identical transistors, each having  $h_{fe} = 100$ ,  $h_{ie} = 2k\Omega$  and  $C_{of} = 2PF$ . The coupling capacitor has a capacitance  $C = 0.4 \ \mu F$ . The load resistance for each transistor is  $R_L = 8 \ k\Omega$ . The wiring capacitance  $C_W = 10 \ PF$ , calculate the lower and upper half power frequencies.
  - (b) Obtain an expression for the voltage gain of an R-C coupled amplifier in the mid, low and high frequency ranges.
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(b) What is the Darlington connecti	on compare between a line of the	01
	on, compare between an emitter follow	er and
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Time : 3 Hours

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

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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 materials is permitted during examination. (Mentioned in form No. 205)

			2	NII	
1	Nil	1. S.	2.	1111	
	1111				

#### UNIT - I

1 (a) Define algorithm. What do you understand by best, worst and average case analysis of an algorithm.

(b) Using suitable example explain row major and column major form of array.

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OR

- (a) Explain the difficulties in estimating exact execution time of Algorithms.
  - (b) Explain Asymptotic notations : Big-Oh, theta, Omega using suitable example.

#### 3E1652-1612 ]

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## UNIT - II

2 (a) Define the concept of recursion using stack using suitable examples. What are the difficulties in dealing with infix expression ?

(b) Convert following expressions in its equivalent postfix expressions.

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(i) A \* (B + C \* D) + E

(ii)  $A * B^{\wedge}C + D$ 

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#### OR

- 2
- (a) Explain tower of Hanoi problem. Explain using suitable diagram and example.

mart be stated

(b) Explain transposition of sparse matrices with algorithms of varying complexity.

## UNIT - III

- 3 (a) Compare binary search and sequential search.
  - (b) Using suitable diagram explain the concept of Head Node in linked lists.

## OR

- 3 (a) Write the algorithm for insertion and deletion in doubly and circularly connected linear linked lists.
- (b) Write down the following polynomial.

 $3x^4 - 2x^2 + 9x - 11$  by a linked list.

#### 3E1652-1612

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## UNIT - IV

- (a) Define the concept of balanced trees. Write pseudo code for insertion into and deletion from AVL tree.
  - (b) Define the different applications of trees for representation of sets.

#### OR

- (a) Define the following binary tree
  - (i) Complete binary tree.
  - (ii) Strictly binary tree.
  - (b) Write an algorithm for inorder travesal of a threaded binary tree.

## UNIT - V

- 5 (a) Compare Internal sorting and External sorting.
  - (b) By taking suitable example explain the principle of operation of heap sort.
  - (c) Prove that Heap sort, Merge sort and Quick sort takes  $\Omega(n \log n)$  tie in the worst case.

#### OR

5 Write short notes on following :

(a) DFS traversal Algorithms

(b) Comparison of sorting Algorithms in terms of time complexity.

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Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 26

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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)

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	North Contraction	1111			3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1.	ch of	1000	2.		NA	

## UNIT - I

(a) Find the 11's complement of following numbers : (i)  $(935)_{12}$  (ii)  $(267)_{12}$ 

(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.

3E1653]

- (c) A register contains 2's complement 10010110. What will be the contain of register if it is divided by 2.
- OR and the state of the second (a) Consider the signed binary number are A = 01000110 and B = 11010011where B is in 2's complement form. Find the value of following Mathematical expression : ATRAN I Waters 9 . 11

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(i) A + B

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- A B where A B is the set of the set
  - (iii) B A
  - 149962354 (iv) - A - B

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

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## UNIT - II - Perty

- 2 What do you understand by following properties of logic family : '(a)
  - (i) Fan out
  - (ii) Figure of merit
  - Noise margin (iii) ble som Vare's a suff where pretriciant in
  - (iv) Current mode logic. and submouth a set



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





#### OR

(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.



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[ P.T.O.

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

# UNIT - III

- (a) Simplify the following boolean function using tabulation method :  $F = \sum m (0, 1, 2, 8, 10, 11, 14, 15) \cdot d(9, 12).$ 
  - (b) Simplify the following boolean function using K-map :  $Y = (A + B) (A + \overline{C}) (\overline{A} + \overline{B}) (\overline{A} + C).$

#### OR

(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  $(V_0)$ .



Fig. 3

(b) Minimize the following boolean function using K-map :  $f(a, b, c, d) = \sum m(0, 1, 2, 8, 9) \cdot d(4, 10, 12)$ 

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# UNIT - IV

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How many 3:8 line decoder with enable input are required to construct 6:64 (a) line decoder without using any other logic ? Draw its block diagram also.

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Find the boolean function implemented by 4:1 mux as shown in Fig. 4. (b)



Fig. 4

OR

Implement a full subtractor using two 4:1 multiplexer. (a)

Find the output of following decoder circuit as shown in Fig. 5. • (b)



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



State the difference between latch and flip flop.

(b) Explain the truth table, circuit diagram and working of universal flip flop.

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[ P.T.O.

(c) What are the counting states  $(Q_1, Q_0)$  for the circuit using D - flip flop as shown in Fig. 7.?



3E1653

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OR 6

3E1653]

(a)

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

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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

# $\frac{2}{\text{UNIT}} - \mathbf{I}^{2}$

1 (a) Find the norton equivalent current in amperes with respect to the terminal P and Q is in fig. 1.



Fig. 1

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## 3E1614]

[ P.T.O.

(b) Find the total current in 10  $\Omega$  resistor in fig. 2 using superposition theorem.

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3+3=6

[ P.T.O.



Fig.2

- (c) Define following and explain :
  - (i) Reciprocity condition in network
  - (ii) Coupling coefficient between two mutually coupled coils.

#### OR

(a) Find the current I in fig. 3 flowing through the  $2\Omega$  resistor using superposition theorem.



Fig. 3

(b) State maximum power transfer theorem and find the maximum power that can flow in load  $Z_L$  in fig. 4.

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(c) Find the equivalent inductance in fig. 5. Assume the frequency is f = 50 Hz.



UNIT - II

2 (a) In fig. 6 the switch was closed for a long time before opening at t = 0. Find the voltage  $V_X$  at (i)  $t = 0^+$  and  $t = \infty$ .



Fig. 6

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4+4=8 [ P.T.O.

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(b) Transform the following network shown in fig. 7 and find.  $I(s), V_{c}(s)$  and  $V_{L}(S)$ .



Fig. 7

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OR

4+2+2=8

6



(b) Find the step response



Fig. 9

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[ P.T.O.

(c) Define the initial and final value condition across an inductor and capacitor.

4 ?

## UNIT - III

(a) Write the restrictions on pole zero location for immittance functions. Check whether following polynomical are Hurwitz or not :

- (i)  $2(s) = 20s^3 + 4s^2 + 9s + 4$
- (ii)  $Y(s) = 1 + s + s^2 + s^3$ .

2+2+2=6

2+2=4

(b) Find  $Z_{11}(s)$  and  $Z_{12}(s)$  in network shown in fig. 10.



Fig. 10

OR

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4+4=8

[ P.T.O.

(c) Write any two property of positive real functions.

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3 (a) Check whether following functions are positive real or not :

(i) 
$$Y(s) = \frac{1+s^2}{s^3+4s^2+2s+1}$$

(ii) 
$$Z(s) = 4s^4 + 2s^2 + 2$$
.

(b) Determine  $Y_{21}(s)$  and  $Z_{12}(s)$  for the network shown in fig. 11.



(c) Draw the pole-zero diagram of  $H(s) = \frac{s^2 + s + 1}{s^3 + 2s^2 + 2s + 1}$ .

## UNIT - IV



(a) Find the Y-parameter in network shown in fig. 12.





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4+4=8

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3+3=6

[ P.T.O.

(b) Convert following Z-parameter in Hybrid parameter.

$$Z = \begin{bmatrix} 10 & 1+2j \\ -4j & 5+4j \end{bmatrix}$$

(c) Write the condition of symmetry and reciprocal network for Z-parameter and Y-parameter.

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2+2=4

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[ P.T.O.

#### OR

(a) Find the h-parameter for the network shown in fig. 13.





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(b) Convert the given h-parameter in equivalent y-parameter

 $h = \begin{bmatrix} 100\Omega & 40 \\ 10^{-3} & 0.0 \mathbf{\nabla} \end{bmatrix}$ 

(c) Define image impedance of a two port network.

3E1614]
## UNIT - V

(a) Realize the Foster and Cauer form network for

(i)  $Z(s) = \frac{s^4 + 4s^3 + 3}{s^3 + 25}$  and

(ii) 
$$Z(s) = \frac{4+5s+s^2}{6+5s+s^2}$$

4+4=8

- (b) Draw the general pole zero diagram of a LC network.
- (c) Write all steps of realize a RC network for driving point impedance.

#### OR

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(a) Realize the first and II Cauer form for

$$Z(s) = \frac{6s^3 + 8s^2 + 4s + 4}{6s^2 + 8s + 1}.$$

- (b) Write all realizability condition of
  - (i) LC network and
  - (ii) RC network.

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Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 26

Nil

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)

Nil

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### UNIT - I

(a) Draw the variation of relative dielectric constant of a solid sample having its molecules permanent dipole moment with temperature. Explain the behaviour (i) when the sample change from solid to melt and (ii) sample changes from liquid to vapour.

2.

2+2+2=6

- (b) Explain the ferroelectric behaviour of  $BaTiO_3$  with the help of its cubic structure.
- (c) An atom of polarizability  $\alpha$  is placed in a homogeneous field *E*. Show that the energy stored in the polarized atom is equal to  $\frac{1}{2}\alpha E^2$ .

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[ **P.T.O.** 

3E1615 ]

- (a) A solid containing N identical atoms per  $m^3$  having polarizability  $\alpha(farad m^2)$ . Assuming a Lorentz internal field derive the Clausius Mosotti relation.
  - (b) What is condition of a sample to show Piezoelectricity ? Give two examples of such material and write their applications.
  - (c) Define dielectric loss and find its expression in terms of loss Tangent. How this phenomena is used in Microwave Oven ?

### UNIT - II

- (a) Write the relation between B, H and M for a magnetic material. Find the flux density and Magnetization of a copper sample when the magnetic field strength is  $10^6$  Amp/Meter. Assume susceptibility of copper is  $-0.5 \times 10^{-5}$ .
  - (b) Define following :
    - (i) Neel temperature
    - (ii) Curie temperature
    - (iii) Coercive force
    - (iv) Spontaneous magnetization.

 $4 \times 2 = 8$ 

2+6=8

6

4

2+2+2=6

#### OR

2 (a) Derive the relation

 $\chi_A = \frac{C}{T + \theta_N}$  for an antiferromagnetic material.

#### 3E1615 ]

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[ P.T.O.

- (b) Write two applications of following in technology :
  - (i) Ferrites
  - (ii)  $Fe_2O_3$
  - (iii) Cobalt and Nickel.

 $3 \times 2 = 6$ 

(c) Define giant magnetostriction resistor (GMR) and write its potential application.

### UNIT - III

- 3 (a) How the Bandgap modify in following conditions ?
  (i) Silicon is doped with Boron.
  - (ii) x is change in  $\frac{Ga}{x} \frac{As}{1-x}$  from x = 0 to x = 1.
  - (iii) Temperature decreases from room temperature to  $0^{\circ}K$  in a thermistor.  $3 \times 2=6$
  - (b) If an *n*-type semiconductor is doped with Boron, then how its conductivity changes with Boron density ? Explain the variation.
  - (c) If the temperature coefficient of an oxide material is  $\alpha = -0.8 \times 10^2 / ^{\circ}C$ then find its resistance at  $T = 500^{\circ}C$ . Assume the  $R_0 = 10 k\Omega$  at  $T = 300^{\circ}C$ .

#### OR

- 3 (a) Write the difference between :
  - (i) n-type and p-type semiconductor
    - (ii) Thermistor and Sensistor
    - (iii) Compound and Element semiconductor.
  - (b) Compare Si, GaAs and SiC in terms of their Bandgap. Also write their potential applications.

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#### 3E1615 ]

[ P.T.O.

 $3 \times 2 = 6$ 

(c) Why indirect Bandgap materials are not suitable in light emitting diode (LED) ? Also write the name of any material useful in LED.

## UNIT - IV.

- (a) Explain the theory of superconductor in detail, which explain the phenomena of high temperature super conductor.
- (b) How Mattheissen rule used for determine the total resistance of a sample? If intrinsic conductivity of Ni and Mn is 10<sup>4</sup> Ω/m and 10<sup>-2</sup> Ω/m. Then find the net conductivity of a sample NiMn x 1-x when (i) x = 0.5 and (ii) x = 0.8.

#### OR

- (a) How Type-I and Type-II superconductor behave in presence of external magnetic field ? Also discuss their response with temperature.
- (b) Define Persistent and Critical current for a superconductor.
- (c) For a specimen of  $V_3Ga$ , the critical fields are respectively  $1.4 \times 10^5 A/m$ and  $4.2 \times 10^5 Amp/m$  for  $14^{\circ}K$  and  $13^{\circ}K$ . Calculate the transition temperature and critical fields at  $0^{\circ}K$  and  $4.2^{\circ}K$ .

### UNIT - V

4

- 5 Write short notes on any two :
  - (i) Quantum Dots
  - (ii) CNT
  - (iii) Bandgap of Nanomaterial
  - (iv) Quantum Wire
  - (v) Fabrication of Nanomaterial.

3E1615

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8×2=16

4

2+3+3=8

6

 $2 \times 2 = 4$ 

3+3=6

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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.

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## UNIT - I

1 (a) What is the position of the fermi level in an intrinsic semiconductor? How does its position change when :

(i) donor and

(ii) acceptors are added to the semiconductor ?

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- (b) A sample of Ge is doped to the extent of  $10^{14}$  donor atoms/cm<sup>3</sup> and  $5 \times 10^{13}$  acceptor atoms/cm<sup>3</sup> at 300 K, the resistivity of intrinsic Ge is  $60 \Omega cm$ . If the applied electric field is 2 V/cm, find the total conduction current density. Assume  $\mu_p/\mu_n = 1/2$  and  $n_i = 2.5 \times 10^{13} / cm^3$  at 300 K.
- (c) What is mass action for the carrier concentration ?

#### OR

- (a) What are "Hall effect" and "Hall field" ? Explain briefly the physical origin of the Hall effect.
- (b) A rectangular semiconductor specimen, 2 mm wide and 1 mm thick, gives a Hall coefficient of  $10^{-2}$  m<sup>3</sup>/c. When a current of 1 mA is passed through the sample, a Hall voltage of 1 mV is developed find the magnetic field and the Hall field.

## UNIT - II

(a) In the circuit of figure the Zener diode is non ideal, having a knee voltage  $V_{zo} = 9V$  and a dynamic resistance  $r_z = 5\Omega$ . If the supply voltage  $V_s$  varies from 15 to 30V, determine the range of variation of the output voltage  $V_o$ , also comment on the result.



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[ P.T.O.

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- (b) (i) What is unijunction transistor ? Give the equivalent circuit.
- (ii) Draw and explain its current voltage characteristics.

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#### OR

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(a)

The voltage waveform  $v_i$  of Figure (a) is applied to the input of the circuit of Figure (b). Show the output voltage  $V_o$  waveform and mark the voltage levels.



Figure (a)

Figure (b)

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[ P.T.O.

Find the PIV of the diode, assumed to be ideal.

(b) Draw the circuit diagram of a fullwave voltage doubler and explain its operation, how can we construct a voltage trippler ?

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3E1641 ]

- (a) Draw the circuit diagram of an emitter follower. Why it is called an emitter follower? Obtain expression for the current gain, input resistance voltage gain and output resistance.
  - (b) A transistor is operating in the CE mode calculate  $V_{CE}$  if  $\beta = 125$ ,  $V_{BE} = 0.6 V$ .



OR

(a) In the circuit of figure shown below,  $\beta = 99$  and  $V_{BE} = 0.7V$ . Calculate the quiescent values of  $I_B$ ,  $I_C$ ,  $I_E$  and  $V_{CE}$ . If  $\beta$  is increases by 20% what is the corresponding change in  $I_C$ ?

$$F_{RE} = 4 k\Omega$$

$$R_{E} = 5k\Omega, R_{E} = 7k\Omega$$

$$R_{E} = 4k\Omega$$

$$R_{C} = 4k\Omega$$

$$R_{C} = 4k\Omega$$

$$V_{CC} = +15V$$

$$V_{EE} = -15V$$

$$V_{EE} = -15V$$

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(b) Draw and label the low frequency h-equivalent of CE amplifier and obtain voltage gain.

## UNIT - IV

 (a) Derive an expression for the small signal voltage gain of a common source FET amplifier.

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[ P.T.O.

(b) A n-channel JFET has  $I_{DSS} = 12$  mA and Pinch off voltage  $V_p = -4V$ . Find the drain current for  $V_{GS} = -2V$ . If the transconductance  $g_{mo}$  of a JFET with the same  $I_{DSS}$  at  $V_{GS} = 0$  is 4 millimho, find the pinch off voltage.

#### OR

(a) Sketch the structure of n-channel depletion type MOSFET. Explain how the depletion region is produced in the channel. Can a depletion MOSFET work in the enhancement mode ?

(b) An n-channel enhancement mode MOSFET, biased as shown in Fig. operates in the active region. The given parameters are  $V_T = 2V$  and

 $K = 0.5 \text{ mA/V}^2$ . Calculate  $I_D$ ,  $V_{GS}$  and  $V_{DS}$  verify that the operation is indeed in the active region.



## UNIT - V

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[ P.T.O.

(a) An RC coupled amplifier employs two identical transistors, each having  $h_{fe} = 100$ ,  $h_{ie} = 2k\Omega$  and  $C_{of} = 2PF$ . The coupling capacitor has a capacitance  $C = 0.4 \ \mu F$ . The load resistance for each transistor is  $R_L = 8 \ k\Omega$ . The wiring capacitance  $C_W = 10 \ PF$ , calculate the lower and upper half power frequencies.

(b) Obtain an expression for the voltage gain of an R-C coupled amplifier in the mid, low and high frequency ranges.

OR

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- (a) Draw the circuit diagram of a common source n channel JFET amplifier. Discuss its small signal operation.
  - (b) What is the Darlington connection, compare between an emitter follower and a darlington pair ?

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B. Tech. (Sem Computer S 3CS4A Objec EE,EX,CS,IT	. III) (Main / c. & Engg. t Oriented Pr	<u>JE1054</u> Back) Exami ogramming	ination, December - 2017
Fime : 3 Hours			Maximum Marks : 8 Min. Passing Marks : 2
Attempt any <b>five</b> All Questions shown wherever assumed and st	questions, sel carry equal m necessary. An ated clearly I	lecting <b>one qu</b> parks. Schemat by data you fe lnits of quanti	<b>testion</b> from <b>each unit</b> . tic diagrams must be tel missing suitably be

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Nil

Nil

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## UNIT - I

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

OR

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

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## UNIT - II

(a) Explain the concept of object oriented analysis with explanation of all steps of analysis.

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(b) What is the meaning of message passing ? Explain in brief.

#### OR

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

## UNIT - III

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

#### OR

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

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## UNIT - IV

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

#### OR

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

### UNIT - V

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

#### OR

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

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	Roll No. :
48	3E1485
<b>3E</b> 1	B. Tech. (Sem. III) (Mercy Back) Examination, December - 2017 Electrical Engg.
	<b>3EE5(O) Electrical Measurements</b>

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

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## UNIT - I

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(a) Explain the testing and calibration of single phase energy meter by phantom loading.

(b) Explain the errors in wattmeter and energy meter and their compensation techniques.

### OR

(a) Explain why electrodynamometer type of instruments can be used both on a.c. and d.c. Why are these instruments used as transfer instruments ?

(b) Explain why PMMC instruments are the most widely used instruments. Discuss their advantage and disadvantage.

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## UNIT - II

- (a) Explain the Arnold's method for testing of current transformer.
  - (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.

#### OR

2 (a) State and derive the Blondel's theorem.

- (b) Explain the effect of secondary burden on the ratio and phase errors of a current transformer.
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### UNIT - III

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

#### 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.

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## UNIT - IV

(a) Explain the importance of the value Earth's resistance. Discuss about the fall of potential method for measurement of Earth resistance.

(b) Explain the principle of working of a Kelvin's double bridge for low resistance measurement.

#### OR

# (a) Explain Price's guard-wire method for measurement at high resistance.

(b) What are the difficulties associated with the measurement of low resistance ? Explain the potentiometer method for the measurement of low resistance.

#### UNIT - V

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

#### OR

- (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.
- (b) Discuss with phasor diagram the Heaviside's bridge for measurement of mutual inductance.

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**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

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2. NIL

16/12

#### UNIT - I

- (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.
  - (b) Determine the permeability of a magnetic material and the factor on which is depend.

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OR

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

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(b) The area of the hysteresis loop of the given magnetic material is 50 cm<sup>2</sup> with the two axes scaled as 1 cm = 20 AT and 1 cm = 50 m Wb, for 50 Hz frequency find the total hysteresis loss.

#### UNIT - II

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

#### OR

- (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.

#### 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 ?

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(ii) For a DC motor, the field-flux control method is called a constant power drive method. Explain.

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A DC series motor, running a fan at 1000 rpm, takes 50 A from 250 V mains. (b) 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.

#### OR

- Discuss the Swinburne's test and explain the procedure to predetermine the (a) efficiency of a DC motor.
- A 10 kW, 240 V, DC shunt motor draw a line current 5.2 A while running (b) 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.

#### UNIT - IV

- In what way a practical transformer differs from an ideal transformer ? Develop (a) the equivalent circuit for the practical transformer.
- Explain the need of parallel operation of single phase transformers. Give the (b) condition to be satisfied for their successful parallel operation.
  - OR
- Define an auto transformer. Derive the expression showing the saving of copper (a) when a two winding transformer is converted into an autotransformer.
- A 220 V, 60 Hz single phase transformer has a hysteresis loss of 340 watts (b) 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 Steinmet'z constant

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## winn V 035 meet a 08 solar mation UNIT - V many

- (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.
  - (b) Explain the open delta connection to carry out 3-phase operation with help of two transformers. State its disadvantages.

#### OR

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(a) Extend an aim training energy Derive the expression showing the energy of templer react a subscription training is confectived and an energy used area.

and index categori institution 120 enginety in mensionment screeced from 230°V. So the support from 510 million 500 mi

- (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 ?
- (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.

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	Boll No.	Total No. of Pages : 4
46	3E1646	
16	B. Tech. (Sem. III) (Mercy Back) Exam	nination, December - 2017
3E	Electrical Engg. 3EE6A Advanced Engg. Mathematics -	1
	JEEGITTE	Maximum Marks : 8

Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 26

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| P.T.O.

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)

Nil 2. Nil 1.

## UNIT - I

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

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

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

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

OR

3E1646 ]

Find the Laplace transform of  $\frac{\cos at - \cos bt}{\cos at - \cos bt}$ 

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

(c) Solve

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(a)

 $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the constraints  $u(x, 0) = 3\sin 2\pi x, u(0, t) = 0 = u(1, t)$ 

() where 
$$0 < x < 1, t > 0$$

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## UNIT - II

(a) Express  $f(x) = \begin{cases} 1 & 0 \le x \le \pi \\ 0 & x > \pi \end{cases}$ as a Fourier sine integral and hence evaluate  $\int_{0}^{\infty} \frac{1 - \cos \pi S}{S} \sin x S \, dS$ 

Obtain the discrete Fourier transform of the sequence  $\{g_k\} = \{1, 0, -1\}$ 

OR

(a) Find the Fourier transform of  $f(x) = \begin{cases} 1, & |x| \le a \\ 0, & |x| > a \end{cases}$ . Also evaluate  $\int_{-\infty}^{\infty} \frac{\sin \lambda a \cos \lambda x}{\lambda} d\lambda$ 

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(b)

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(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  $x \to \infty$ .

## UNIT - III

(a) Find the Fourier series to represent f(x) = |x| for  $-\pi < x < \pi$ 

Tabanne Sterre

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

## OR

(a) Find Half range sine series for the function f(x) = 2x - 1 in 0 < x < 1

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

- UNIT IV
- (a) Determine the Analytic function w = u + iv if  $u = e^{2x} (x \cos 2y - y \sin 2y)$
- (b) Show that the transformation  $w = \frac{2z+3}{z-4}$  maps the circle  $x^2 + y^2 4x = 0$ in to the straight line 4u + 3 = 0.

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

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

UNIT -  $\mathbf{V}$ 

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

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

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

(b) . Evaluate

$$\int_{0}^{\infty} \frac{dx}{\left(x^2+1\right)^2}$$

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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)



- (a) Explain the variation of resistance, inductance and capacitance reactance with frequency.
  - (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

OR

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

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[ P.T.O.

- (a) Write down the Principle of duality.
- (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.



UNIT - II

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[ P.T.O.

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

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



OR

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2 (a) Explain the Thevenin's theorem.

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(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.



#### UNIT - III

- (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.
  - (b) Explain the measurement of power and power factor of a balanced three phase load by using two wattmeter method.

#### OR

- (a) Write down the relationship between line and phase voltages and currents in delta connection with a suitable diagram.
  - (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.

## UNIT - IV

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

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OR

Find the line spectrum of following waves using Fourier analysis.



UNIT - V

- (a) Derive the expression for step response of a RL series and parallel ckt.
- (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.



OR

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

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4	Roll No	— Tota	l No. of Pages : 3
163	B. Tech (Sem 111)	3E1634	
3E	Automobile Engg 3AE4A Manufactur	(Mercy Back) Examination, 1 5. ring Processes	December - 2017

Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 24

19/12

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 materials is permitted during examination. (Mentioned in form No. 205)

Nil

2.

## Nil

## UNIT - I

(a) Write the introduction and classification of manufacturing processes.

- (b) Explain the properties of moulding sand.
  - (b) Discuss the Gating system.

OR

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## [ P.T.O.

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- (a) What is investment casting ? What are the main materials used for making the investment pattern ? What the advantages of investment casting ?
- (b) With the help of neat sketch explain Slush casting process. What are the advantages and applications of Slush casting ?

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## UNIT - II

- (a) What are the differences between hot working and cold working ?
  - (b) Explain the drop forging and press forging methods.

#### OR

- 2 (a) Discuss the characteristics and applications of hot rolling and cold rolling.
  - (b) How to estimate the forces and power for shearing and drawing operations ?

#### UNIT - III

- (a) Explain the explosive welding with its applications.
  - (b) Explain the following welding techniques with the help of neat sketches:
     (i) MIG Welding
    - (ii) Spot Welding

#### OR

- 3 (a) Distinguish between gas welding, arc welding, and resistance welding with respect to temperature generated, quality of welding obtained, application, and cost.
  - (b) Briefly explain welding defects.

#### 3E1634 |

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#### UNIT - IV

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Explain the properties of powder processed materials.

(b) Explain the following :

(i) Mechanical pulverization

(ii) Electrolytic process

### OR

- (a) Give four examples of the products manufactured by powder metallurgy process. List four components, which cannot be manufactured by powder metallurgy.
- (b) Write short notes on following :
  - (i) Subtractive processes
  - (ii) Additive processes

#### UNIT - V

- (a) What are plastics ? Name two broad classifications of plastics. Distinguish between them.
- (b) Describe with the help of neat sketches the following plastic processing. methods stating their advantages and applications :
  - (i) Transfer moulding
  - (ii) Extrusion moulding

#### OR

- 5 Write short notes on the following :
  - (i) Injection moulding
  - (ii) Properties of plastics
  - (iii) Thermoforming
  - (iv) Ingredients of moulding compounds.

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Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 24

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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)

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NII			

#### UNIT - I

1 What is class ? Explain various other features of object orient programming in C++ in detail.

#### OR

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- (a) Write a program in C++ to store the book information in a Central Library. Also write function to update the book information.
- (b) Write short note on Message Passing with an example.

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[ P.T.O.

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## UNIT - II

(a) What is a pointer ? How it is available to member function of a class ? Explain.

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[ P.T.O.

(b) What are the uses of reference in functions ?

#### OR

- 2 (a) Explain the purpose of a function parameter. Also explain the difference between parameter and an argument.
  - (b) Explain '+' operator overloading with an example.

## UNIT - III

- (a) Write brief note on friend function and show how modifying a class's private data with a friend function.
  - (b) Compare constructor conversion and operator conversion.

#### OR

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3 Explain various forms of inheritance with appropriate examples.

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## UNIT - IV

4 Explain standard tempelate library and standard library container class in detail.

#### OR

- (a) Write a program which clearly describes function and class tempelates.
  - (b) Write short note on files and streams classes.

## UNIT - V

- 5 (a) Write a function to insert and delete the element in a sorted single linked list.
  - (b) What is circular queue ? Explain the need of taking an array of size one more than the size of queue.

### OR

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- 5 (a) Explain doubly linked list with an appropriate example.
  - (b) Write short note on priority queues with example.

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9	Roll No		Total No. of Pages : 4		
63		3E1636			
3E1	B. Tech. (Sem. III) (Main/Back) Examination, December - 2017 Automobile Engg.				
	JAEOA Advanced	Engg. Mathematics (A	E, ME, PI)		

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Time : 3 Hours

Maximum Marks : 80 Min. Passing Marks : 26

Nil

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 materials is permitted during examination. (Mentioned in form No. 205)

\_\_\_\_\_

1.

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Nil 2.

# UNIT - I

(a) Define the discrete Fourier transform. Find the discrete Fourier transform of the sequence  $\{1, 0, -1\}$ .

2+6

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[ P.T.O.

(b) Find the Fourier transform of  $f(x) = \begin{cases} 1-x^2 & \text{, for } |x| \le 1 \\ 0 & \text{, for } |x| > 1 \end{cases}$ 

OR

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Hence evaluate  $\int_{0}^{\infty} \left( \frac{x \cos x - \sin x}{x^3} \right) \cos \frac{x}{2} dx$ 

3E1636 ]

- 1 (a) Find f(x) if its Fourier sine transform is  $\frac{1}{s}e^{-as}$ . Hence deduce  $\overline{F}_s^{-1}\left(\frac{1}{s}\right)$ . 6+2
  - (b) Solve :  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ , given that  $u_x(0, t) = 0$  and  $u(x, 0) = \begin{cases} x & 0 \le x \le 1 \\ 0 & x > 1 \end{cases}$ , u(x, t) is bounded and x > 0, t > 0.

# UNIT - II

(a) Find 
$$L\left\{\sin\sqrt{t}\right\}$$
. Hence show that  $L\left\{\frac{\cos\sqrt{t}}{\sqrt{t}}\right\} = \sqrt{\frac{\pi}{s}} e^{-\frac{1}{4}s}$ .  
(b) Use Laplace transform technique, to solve the differential equation :

(b) Use Laplace transform technique, to solve the differential equation  

$$(D^2 + 9)y = \cos 2t, \ y(0) = 1. \ y = \left(\frac{\pi}{2}\right) = -1.$$

#### OR

2 (a) (i) Find the inverse Laplace transform of  $\frac{s}{s^4 + s^2 + 1}$ .

(ii) If 
$$L\{f(t)\} = \overline{f}(s)$$
, then prove that  $L\{\frac{1}{t}f(t)\} = \int_{0}^{\infty} \overline{f}(s) ds$ ,

- provided that the integral exists. Hence obtain  $L\left\{\frac{1}{t}(\cos at \cos bt)\right\}$ .
- (b) Find the bounded solution y(x, t), 0 < x < 1, t > 0, of the boundary value problem  $\frac{\partial y}{\partial t} \frac{\partial y}{\partial t} = 1 e^{-t}$ , y(x, 0) = x.

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value problem 
$$\frac{\partial y}{\partial x} - \frac{\partial y}{\partial t} = 1 - e^{-t}$$
,  $y(x, 0) = x$ .

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# UNIT - III

(b) Razor blades are supplied by a manufacturing company in packets of 10. There is a probability of 1 in 100 blades to be defective. Using Poisson distribution, calculate the number of packets containing one defective blade, no defective blade and all defective blades in a consignment of 10,000 packets.

### OR

- (a) Define the Binomial distribution and find its mean and variance.
- (b) If the heights of 300 students are normally distributed with mean 64.5 inches and standard deviation 3.3 inches, how many students have heights.
  - (i) less than 5 feet, i.e. 60 inches
  - (ii) between 5 feet and 5 feet 9 inches.

# UNIT - IV

(a) Define the operators  $\Delta$ ,  $\delta$ , E and  $\mu$ , prove that

(i)  $\mu \delta = \frac{1}{2} \Delta (1 + E^{-1})$ 

(ii) 
$$E = 1 + \frac{\delta^2}{2} + \delta \sqrt{1 + \frac{\delta^2}{4}}$$

(b) The ordinates of the normal curve are given by the following table : 2+3+3

OR

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<i>x</i> :	0.0	0.2	0.4	0.6	0.8
<i>y</i> :	0.3989	0.3910	0.3683	0.3332	0.2897
Eval	uate ·				

(i) 
$$y(0.25)$$
 (ii)  $v(0.43)$ 

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[ P.T.O.

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(a)

Using Stirling formula compute  $u_{12,2}$  from the following table:

<i>x</i> :	10	11	12	13	14
$10^5 u_x$ :	23967	28060	31788	35209	38368

(b) Use Lagrange's interpolation formula to find y when x = 2, given that  $\mathbf{x}$ : 0 1 3 .4 5 y: 6 50 105

## UNIT - V

5 (a) Evaluate 
$$\int_{0}^{\pi/2} \sqrt{\cos x} \, dx$$
 by Simpson's  $\frac{1}{3}$  and  $\frac{3}{8}$  rule.

(b) If 
$$\frac{dy}{dx} = x + y^2$$
.

Use Runge-Kutta method of fourth order to find an approximate value of y for x = 0.2; given that y = 1 when x = 0. (Take h = 0.1)

#### OR

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(a) From the following table :

<i>x</i> :	1.0	1.2	1.4	1.6	1.8	20
$f(\mathbf{x})$ :	0.0000	0.1280	0.5440	1.2960	2 4320	4 0000
	the second second				2.1520	4.0000

Find f''(1.2) and f'(1.8).

(b) Given  $\frac{dy}{dx} = x^2 + y$ , y(0) = 1. Determine y(0.02) and y(0.04), using Euler's modified method.

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	Roll No
-	
63	3E1631
1	B. Tech. (Sem. III) (Main/Back) Examination, December - 2017
E	Aeronautical Engg.
C	3AN1 Mechanics of Solids (AE, ME, PI, AN)

ME

Time : 3 Hours

# Maximum Marks : 80 Min. Passing Marks : 24

12/12

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 materials is permitted during examination. (Mentioned in form No. 205)

1. NIL

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2. NIL

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### UNIT - I

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(a) Briefly explain :

(i) Poisson ratio

(ii) Lateral strain

(iii) Complementary shear stress

(iv) Thermal stress and strain

(v) Generalized Hook's law

(vi) Factor of safety.

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(b) A composite rod as shown in figure is loaded by various axial forces, determine largest value of P such that the stress in steel does not exceed 150 MPa and that in brass does not exceed 75 MPa. Hence determine elongation of the bar. Take

 $E_{steel} = 200 \ GPa \quad \& \quad E_{brass} = 75 \ GPa.$ 





#### OR

(a) A rectangular taper plate of length 'L'. The width of plate varies uniformly from 'a' at one end and 'b' at other end. Find extension of plate when it carries an axial pull P and having uniform thickness t.

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(b) A steel tube of 45 mm in external diameter and 3 mm thickness encloses centrally a solid copper bar of 30 mm diameter. The bar and the tube are rigidly connected together at the ends at a temperature of 30°C. Find the stress in each metal when heated to 180°C. Also find increase in the length, if original length of assembly is 300 mm. Coefficient of expansion for steel and copper are  $1.08 \times 10^{-5}$  and  $1.7 \times 10^{-5}$  respectively per degree centigrade.

$$E_{steel} = 2.1 \times 10^{-5} \ N/mm^2$$
,  $E_{cu} = 1.1 \times 10^{-5} \ N/mm^2$  for copper.



Fig. 2

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((b) A composite rod as sill vertical is located variou as forces, the forces of the state of th

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(a) A rectangular tage

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centrally a solid coope

- **3** (a) Define and explain theory of failure :
  - (i) Maximum principal stress theory
  - (ii) Maximum strain energy theory.
  - (b) A short metallic column of 500 mm<sup>2</sup> cross sectional area carries an axial compressive load of 100 kN for a plane inclined at 60° with the direction of load. Calculate section

- (i) Normal stress
- (ii) Tangential stress
- (iii) Resultant stress
- (iv) Maximum shear stress
- (v) Obliquity of resultant stress.
- (c) Derive equation for equivalent Twisting and bending moment.
  - OR

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(a) Find by Mohr's circle method Normal; and shear stress on section AB. Also find Max. shear stress.



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Determine following :

Resultant stress on plane BC (i)

(ii) Principal stresses and their directions

(iii) Max. shear stresses and their planes.

ptions in theory of bending ?

### UNIT - III

#### (a) Derive relation between load shear force and bending moment. 5

Draw S.F. and B.M. diagram and find point of contraflexure if any. (b)



(b)

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(a) Explain different types of beams, load and supports.

(b) Draw S.F. and B.M. diagram of simply supported beam of span 2.5 m subjected to U.D.L. and clockwise couple.

(0)

Determine following

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Fig. 6

# UNIT - IV

(a) What is pure bending ? What are the assumptions in theory of bending ?

(b) A rectangular beam 60 mm wide and 150 mm deep is simply supported over a span of 4 m. If the beam is subjected to U.D.L. of 4.5 kN/m. Find maximum bending stress in the beam.

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(c) Derive flexure formula for beam.

 $\frac{M}{I} = \frac{a}{v} = \frac{E}{R}$ 

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te (a) Show for Triangular section the distribution of shearing stress. (B) 8 12

Two  $150 \times 150$  mm rectangular timber section glued together to form a (b) T-section as shown in figure. If bending moment 4 kN-m applied on beam n len ×2 cm about horizontal axis then find : the real distribution for id fixed and

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bound

- (i) Stress at extreme fibres
- (ii) Calculate total compressive force

num 021 mm (iii) Total force due to tensile bending stress. in - uler's (0) i I in long and hinged at both 4 AC . I GE in the



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Derive the torsion equation and state the assumptions made. (a)

A hollow shaft of diameter ratio 3/8 (inner to outer) is to transmit 375 kW (b) at 100 rpm. The max. torque 20% more than mean torque. Shear stress not to exceed 60 N/mm<sup>2</sup> and twist in the 4 m length is not to exceed 2°. Calculate inside and outside diameter which satisfy both the conditions

$$G = 0.85 \times 10^5 \ N/mm^2$$

OR

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10 (a) Explain Euler's theory and assumptions made in theory. Also brief the limitation of Euler's formula.

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(b) Determine crippling load for a T-section of dimensions 12 cm × 12 cm × 2 cm and of length 6 m when it is used as column with one of its end fixed and

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other hinged  $E = 2 \times 10^5 \ N / mm^2$ . I since

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(c) Find Euler's crushing load for a hollow cylindrical cast from column 120 mm extreme diameter and 20 mm thick. If it is 4.2 m long and hinged at both ends. Take  $E = 80 \text{ kN} / \text{mm}^2$ . Compare this load with crushing load given

by Rankine formula using constant  $f = 550 \ N/mm^2$  and  $a = \frac{1}{1600}$ .

itory shaft (d ratic ae 20 at 100 rpm. The me to exceed 60 N/mm<sup>2</sup>, n<sup>2</sup> ist in tuo br dw rt

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2	Roll No. : Total Printed Pages : 3
63	<b>3E1632</b>
G	B. Tech. (Sem. III) (Mercy Back) Examination, December - 2017
3	Mechanical Engg.
	3ME2A Material Science & Engg.

14/12

Time : 3 Hours

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Maximum Marks : 80 Min. Passing Marks : 24

Nil

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)

Nil	. 2.	

### UNIT - I

(a) With neat sketches, explain crystal lattice of BCC and FCC.

(b) Explain with neat sketches, the various types of crystal imperfections.

OR

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Explain slip and twinning mechanisms with neat sketches. (a)

(b) What is recovery, recrystallization and grain growth ? Draw suitable graph to explain.

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### UNIT - II

- Distinguish between homogeneous and heterogeneous nucleation for (a) solidification of a pure metal.
  - (b) Draw an equilibrium diagram of binary isomorphous alloy system, also explain it.

#### OR

Draw iron carbon equilibrium diagram and label the various phase, fields and temperature. Discuss in brief different reactions that take place in the system.

#### UNIT - III

Describe all the transformation which appear in TTT curve for steel. 3

#### OR

- Explain briefly the following heat treatment operations : 3
  - (i) Annealing

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(ii) Normalising

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- (iii) Hardening
- (iv) Tempering.

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# UNIT - IV

- What are properties and engineering applications of PMMA, ABS, PVC, PA (a) and PTFE ?
- (b) Write a short note on urea and phenol formaldehyde.

OR

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(a) Explain the effects of addition of Si, Cr, Mo, V and W alloying elements on the properties of steel.

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- (b) Write short notes on :
  - (i) Stainless steel
  - (ii) Tool steel.

# UNIT - V

(a) Explain Rockwell hardness testing method with sketch.

(b) Discuss Izod and Charpy impact test for the materials with sketch.

### OR

- (a) Discuss the properties and applications of  $Al_2O_3$ ,  $Si_3N_4$ , SiC and PSZ.
  - (b) Explain various properties and applications of Nano structured materials.

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Time : 3 Hours

# Maximum Marks : 80 Min. Passing Marks : 26

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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)

	Nil	2.	Nil
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# ÚNIT - I

1

(a) (i) What is property? Distinguish between different types of properties.

(ii) What is thermodynamic equilibrium ?

(b) A 0.5 m<sup>3</sup> vessel is fitted with air at atmospheric pressure. The air is churned by a paddle wheel attached to a shaft 0.1 m in dia., rotating at a speed of 1800 rpm. A force of 5N acts on the rim of the shaft. What would be the pressure in the vessel after 10 second of operation ?

#### OR

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#### 3E1633 |

- (a) Apply first law to the following processes of a closed system using ideal' gas as the working substance :
  - (i) Constant volume
  - (ii) Constant pressure
  - (iii) Constant temperature
  - (iv) Reversible adiabatic.
- (b) Five kilogram of air initially at 25°C and atmospheric pressure (101.325 kPa) is heated in a rigid container by adding 10 kJ of heat. Calculate the change in internal energy of the system and the final temperature attained.

## UNIT - II

- 2 (a) (i) Explain the working principle of a Carnot engine.
  - (ii) What is perpetual motion machine of the second kind ?
  - (b) A Carnot refrigerator operates between temperature limits of 7°C in the evaporator and 35°C in the condenser. It is now desired to keep a medicine which requires a steady temperature of -5°C, in the refrigerator. By what percent should the compressor capacity be increased keeping the same refrigerating effect and the same condenser temperature ?

#### OR

2 One kg of nitrogen expands from 200 kPa and 400°C to 100 kPa and 300°C. Calculate the entropy change along different paths and prove that entropy is a point function.

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# UNIT - III

- (a) (i) What is triple point ? Explain with reference to P-T, P-V and T-V planes.
  - (ii) What is pure substance ? Explain in detail.
  - (b) Derive the relations for the entropy change of an ideal gas in terms of T-P, T-V, P-V.

#### OR

3 A vessel with a volume of 0.1 m<sup>3</sup> contains an ideal gas at 100°C, 600 kPa. It expands isentropically to a final pressure of 150 kPa. Evaluate the work done. Assume  $C_v = 0.7202$  kJ/kgK and  $C_p = 1.0044$  kJ/kgK.

### UNIT - IV

- (a) Explain with P-V and T-S diagram Otto cycle, Diesel cycle, Dual cycle and Brayton cycle.
- (b) Derive an expression for the air standard efficiency of a diesel cycle.

#### OR

4 The velocity of sound C in a medium is given by  $C = \sqrt{\left(\frac{\partial p}{\partial \rho}\right)_s}$ . Find an expression for the velocity of sound in terms of such as the velocity.

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for the velocity of sound in terms of such quantities as p, u, T, R and k for (a) an ideal gas and

(b) an incompressible liquid.

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### UNIT - V

5 (a) What factors render the Carnot cycle an impractical cycle ?

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(b) What is cogeneration ? Explain the working principle of a practical cogeneration plant.

# OR

A steam power plant operates on the Rankine cycle with superheated steam entering the turbine at 4 MPa and 300°C. The steam is condensed in a condenser at 20 kPa. Determine the thermal efficiency of the cycle assuming ideal conditions.

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