

FACULTY OF ENGINEERING**B.E. (Civil) III – Semester (CBCS) (Main) Examination, December 2017****Subject: Engineering Geology****Time: 3 Hours****Max.Marks: 70****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (10x2 = 20 Marks)**

- 1 What is porphyritic texture? Give one example.
- 2 Draw a net sketch of fault and label it.
- 3 List out goldrich series of minerals.
- 4 Match the following:

Grade of weathering	Unconfined compressive strength (N/mm ²)
a) Fresh	i) < 25
b) Slightly weathered	ii) 25 – 100
c) Moderately weathered	iii) 100 – 150
d) Strongly weathered	iv) 150 – 250
e) Very strongly weathered	v) > 250

- 5 What is reservoir? List out problems of reservoir.
- 6 Explain payline and over break of tunnel.
- 7 Illustrate the geology of an Indian Tunnel that you know?
- 8 Explain disaster management cycle.
- 9 Draw net sketch of stress-strain behaviour of marble.
- 10 List out photo interpretation elements.

PART – B (5x10 = 50 Marks)

- 11 Describe the identification characteristics, engineering properties and constructional use of:

a) Granite	b) Basalt	c) Sandstone	d) Marble	
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- 12 What is fault? Explain classification of faults and add a note on mechanism of faulting. 10
- 13 a) How do you determine grade of rock weathering by petrographic and rock testing. 5
- b) Describe the most dominant soil types of India. 5

- 14 a) What are aquifers? Describe types of aquifers with neat sketches. 5
b) Evaluate the abundance of groundwater availability in different litho logical formations. 5
- 15 a) Describe the field procedures for vertical electrical sounding survey. 5
b) Describe the method of interpretation of aerial photos. 5
- 16 Discuss the various problems in tunneling. Suggest the necessary solutions accordingly. 10
- 17 Identify the elements at risk, causes, typical effects and main mitigation measures of earthquakes. 10

FACULTY OF ENGINEERING

B.E. (EE/Inst.) III - Semester (CBCS) (Main) Examination, December 2017

Subject: Prime Movers and Pumps

Time: 3 Hours

Max. Marks: 70

Note: Answer all questions from Part A and any five questions from Part B.**PART-A (20 Marks)**

1. Define Newtonian and Non Newtonian fluids? 2
2. Classify the Turbines? On the basis of Head flow 2
3. What is slip in Reciprocating pumps? 2
4. Define the Equation of Continuity? 2
5. What are the effects of Cavitations? 2
6. Write the differences between Water tube and Fire tube Boilers? 2
7. Enumerate the various uses of Gas Turbine? 2
8. State methods of increasing thermal efficiency of Rankine cycle? 2
9. Write expression for head lost due to friction in suction and delivery pipes? 2
10. Define Reynolds number? 2

PART-B (50 Marks)

11. State Bernoulli's theorem? Derive expression for Bernoulli's theorem and state the assumptions made for such derivation? 10
12. a) Explain the difference between Francis and Kaplan Turbine? 4
b) Explain working Of Pelton wheel with Neat Sketch? 6
13. Define centrifugal Pump? Explain the working of single stage centrifugal pump with neat sketch? 10
14. Explain Rankine Cycle and Modified Rankine cycle with pressure velocity graphs? 10
15. a) Explain with the help of neat sketch single stage impulse turbine. Also explain pressure velocity variations along the axial direction? 6
b) Explain the difference between Impulse steam turbine and reaction steam turbine? 4
16. Explain Babcock & Wilcox Boiler with neat Sketch? 10
17. a) What is air vessel? Describe the functions of air vessels for reciprocating pumps with neat sketch? 5
b) Water is flowing through a pipe of dia 200mm and 100mm at section 1 & 2 respectively. The rate of flow through the pipe is 35 lts/sec. section 1 is 6 meter; section 2 is 4 meter above datum line. If the pressure at section 1 is $4 \times 10^3 \text{ KN/m}^2$ find the pressure at section 2? 5

FACULTY OF ENGINEERING

B.E (ECE) (CBCS) III – Semester (Main) Examination, December, 2017

Subject : Electronic Devices

Time : 3 Hours

Max Marks : 70

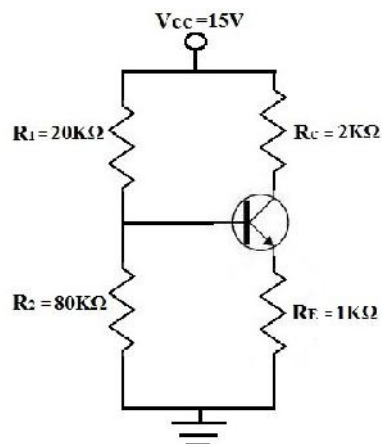
Note: Answer all questions from Part – A & Any five questions from Part – B.

Part - A (20 MARKS)

1. Obtain expression of Diode voltage and Calculate the diode voltage value for a silicon diode given $I_0 = 1\text{nA}$, $I = 2\text{ mA}$ and $V_T = 26\text{mV}$ (2)
2. Distinguish between avalanche and zener diode. (2)
3. Justify the statement “A capacitor filter cannot be connected in series to a rectifier to obtain DC voltage”. (2)
4. A bridge rectifier has $R_L = 350\Omega$ and $V_m = 22 \sin(100\pi t)$. Calculate peak, average and rms value of current. (2)
5. Calculate the collector current in a BJT given $I_b = 30\text{ MicroAmp}$, $\text{Beta} = 100$ and reverse saturation current $I_{C0} = 10\text{nA}$. (2)
6. Draw the input and output characteristics of BJT in CE configuration (2)
7. Illustrate the VI characteristics of SCR and explain the negative resistance region in it. (2)
8. Which BJT amplifier configuration is known as a buffer and why? (2)
9. Differentiate between enhancement and depletion mode MOS FET (2)
10. Given $I_d = 12\text{mA}$, $I_{DSS} = 4\text{mA}$ and $V_p = 4.3\text{V}$ Calculate transconductance of FET. (2)

Part - B (50 Marks)

11. a) Explain the formation of potential barrier across a PN junction diode with no bias condition. Discuss the variation in width of this barrier with the applied voltage in forward and reverse biased condition. (5)
- b) Obtain the expression for diffusion capacitance in a step graded junction (5)
12. a) Analyze the operation of Full wave rectifier and show that its efficiency is double the efficiency of HWR (7)
- b) Obtain critical inductance of an LC filter given $R_L = 100\text{ ohms}$, and $F_o = 60\text{ Hz}$ (3)
13. a) What is base width modulation and what are its consequences (5)
- b) For a self Bias Circuit shown below calculate the Q point and stability factor. Assume $\text{Beta} = 100$ (5)



14. a) Compare the Performance of CE, CB and CC amplifier configurations (5)
b) Calculate A_i, R_i, A_v and R_o using exact analysis for the RC coupled common emitter BJT amplifier, assume $h_{ie} = 1.1\text{Kohm}$, $h_{fe}=50$, $h_{re} = 2.5 \times 10^{-4}$ and $h_{oe}=24 \times 10^{-6}$. $R_L=4.7\text{K ohm}$ (5)
15. a) Explain the structure of JFET and obtain its transconductance and output resistance from its transfer and output characteristics respectively (5)
b) Determine the I_{DS} and g_m of an n-channel JFET having pinch off voltage $V_p=-4\text{v}$, $I_{DSS}=12\text{mA}$ for (i) $V_{gs}=0\text{v}$, (ii) $V_{gs}=-2\text{v}$ and (iii) $V_{gs}=-5.0\text{v}$. (5)
16. a) Draw an FWR with inductor filter and obtain the expression for its ripple factor (5)
b) Design a self bias circuit for Q point (6v, 1.5mA) and stability factor of 8. Given $V_{cc}=12\text{ volts}$ and $\text{Beta}=50$. (5)
17. Write short notes on the following (2.5X4)
a. Tunnel Diode
b. Diode compensation
c. Low frequency T model of BJT,
d. Small signal model of JFET

FACULTY OF ENGINEERING**B.E. (M/P) III – Semester (CBCS) (Main) Examination, December 2017****Subject: Engineering Thermodynamics****Time: 3 Hours****Max.Marks: 70****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (10 x 2=20 Marks)**

- 1 Explain macroscopic approach of thermodynamics.
- 2 What is a quasistatic process?
- 3 Give the mathematical expression for the first law of thermodynamics.
- 4 What is PMM1?
- 5 State Carnot's theorem.
- 6 Explain the term energy.
- 7 Explain the concept of phase change.
- 8 What is a pure substance?
- 9 Give the expression for air standard efficiency of otto cycle.
- 10 Give the relation between volumetric and gravimetric analysis.

PART – B (5x10 = 50 Marks)

- 11 a) Explain second law of thermodynamics.
b) Explain the types of thermodynamic systems.
- 12 a) Prove that internal energy is a property of the system.
b) A mass of air has an initial pressure of 1.3 MN/m^2 , volume 0.014 m^3 and temperature 135 .
c) It is expanded until its final pressure is 275 kN/m^2 and its volume becomes 0.056 m^3 .
Determine
 - a) The mass of air
 - b) Law of expansion
 - c) Work transfer
 - d) Heat transferTake $R = .287 \text{ KJ/kg K}$ and $C_v = 0.718 \text{ KJ/Kg K}$.
- 13 a) Explain equivalence of Kelvin Planck and Clausius statement.
b) Derive Helmholtz function.

- 14 a) Determine the specific liquid enthalpy and specific enthalpy of
- 1) Dry saturated steam and
 - 2) Wet steam with dryness fraction 0.9 at a pressure of 0.8 MN/m^2 .
- b) Compute the specific entropy of steam in the following states
- a) Dry and saturated at 10 bar abs
 - b) Saturated at 8 bar 0.9 dry
 - c) Superheated at 12 bar abs and 300 C. Take $C_p = 2.09$.
- 15 a) Derive the expression for air standard efficiency for rankine cycle.
- b) Explain Daltons law.
- 16 a) Explain clausius inequality.
- b) Explain the corollaries of first law of thermodynamics.
- 17 a) Write down Maxwell relations.
- b) Explain thermodynamic equilibrium.

FACULTY OF ENGINEERING**B.E. (AE) III - Semester (CBCS) (Main) Examination, December 2017****Subject: Automotive Electrical & Electronics Engg.****Time: 3 Hours****Max. Marks: 70****Note:** Answer all questions from Part - A and any five questions from Part - B.**PART-A (20 Marks)**

1. Why Lead acid battery is called Lead acid battery? 2
2. Capacity of a battery is expressed by a term..... and why? 3
3. Which single unit regulator is required for battery charging with an alternator system and why? 3
4. Torque required at starting is in the range of 3
5. Speciality of Bendix drive is 3
6. Define third brush regulation 3
7. CDRI stands for and executed by type of electronic engine management system 3
8. Why relay is incorporated in a starter motor? 2
9. How electronic collision system works? 2

PART- B (50 Marks)

10. a) Briefly describe the salient characteristics of a battery.
b) Explain briefly HRD and cell gravity tests.
- 11 Describe with a neat sketch the Light beam adjusting tests – How dazzling is caused and its prevention.
12. a) Explain principles and constructions of a motor and a dynamo.
b) Describe overrunning clutch system with a neat sketch.
13. a) Explain briefly shunt generator characteristics.
b) With a neat sketch, explain the working principle of a cut out system.
14. a) Where do you require a bridge rectifier and why?
b) Describe briefly engine electronics control, chassis electronic control and transmission electronic control.
15. a) Where stepper motors are used in automobile and why – explain.
b) How precisely air mass flow is required to be controlled electronically and why?
16. Write short notes on the following:
 - a) 32 bit microprocessor control unit.
 - b) CDRI system.
 - c) Infra red brake control system.

FACULTY OF ENGINEERING

B.E. (CSE) III - Semester (CBCS)(Main) Examination, December 2017

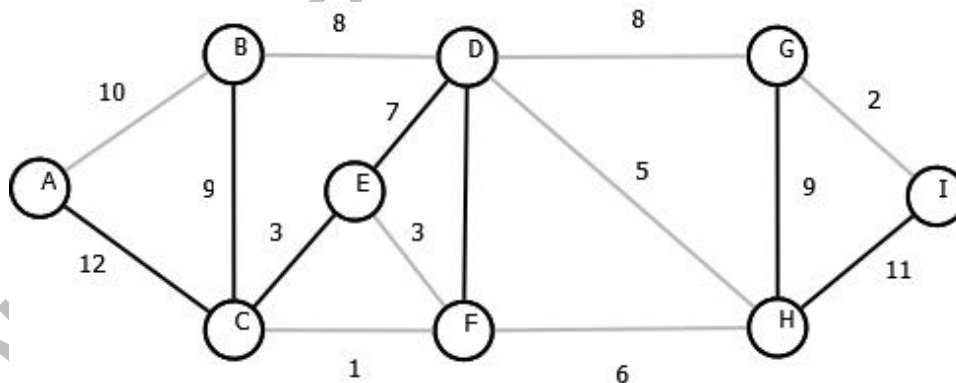
Subject : Data structures

Time : 3 Hours

Max. Marks: 70

Note: Answer all questions from Part-A and answer any five questions from Part-B.**PART – A (2x10 = 20 Marks)**

- 1 List the worst case time complexities in descending order $O(n \log n)$, $O(n)$, $O(n^2)$, $(n^2 \log n)$, $O(2^n)$, $O(1)$.
- 2 Define the ADT for a Linked List.
- 3 List 3 differences between the usage of Array and a Linked list at real time.
- 4 Convert the below postfix expression into Infix? $x y ^ 5 z * / 10 + 7 3 / - 2 +$.
- 5 With a neat diagram elaborate the drawback of a Binary Search Tree
- 6 Give 2 differences between B-Tree and AVL Tree.
- 7 List the various types of Graph representation techniques.
- 8 Define 2 Spanning Tree's from the graph given below



- 9 Justify, which sorting algorithm better suits for a smaller set of values?
- 10 Write pseudo code for Selection Sort?

PART-B (5x10 = 50 Marks)

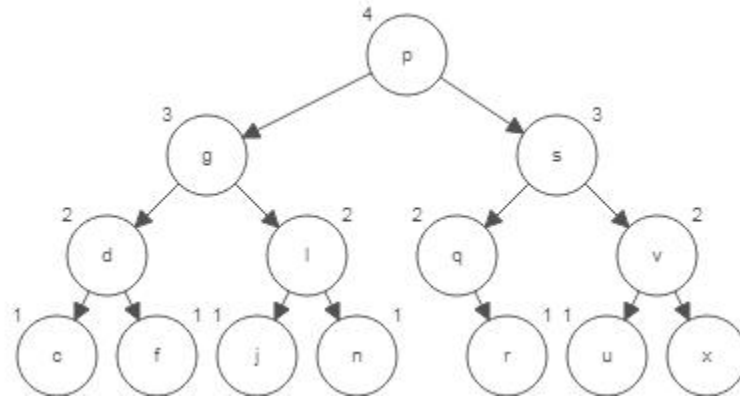
- 11 (a) Define a Sparse matrix. How can we represent a sparse matrix by effectively utilizing space? Write the logic
(b) Develop a program for developing a Singly Linked List.
- 12 (a) Define Skip List. Explain its benefits over linked list and define how is this connected to a tree.
(b) Using the operations of a Stack, implement a Queue data structure. Note: You can only use the functionalities of Push and Pop.

..2..

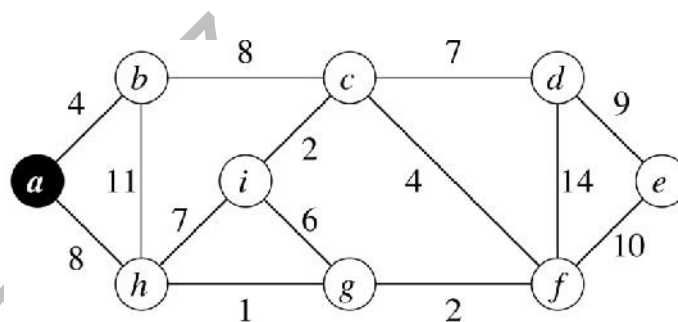
13 (a) Given the inorder and postorder traversals, construct a Binary Tree

4 5 6 7 8 10 11 12 13 ----- 6 5 7 4 11 12 10 13 8

(b) From the below AVL tree, delete the following nodes p, n, l, j, g, f, s and display the final AVL tree



14 (a) Given the following graph, compute the minimum spanning tree using Kruskal's algorithm



(b) Demonstrate BFS starting from vertex 'c' using the graph above.

15 (a) Explain the working of Quick sort algorithm for sorting in descending order, when the given numbers are already sorted in the ascending order.

(b) Explain the working of a Merge Sort algorithm and write the recursive function for merge function call.

16 (a) Specify the conditions for identifying a circular linked list to be full and empty

(b) Demonstrate Hashing using chaining technique to resolve collisions.

17 Write short notes on any **TWO** of the following

(a) Insertion into BST {3, 6, 9, 1, 4, 2, 10, 12, 7} and delete root nodes until we have a complete binary tree of height 2.

(b) Prim's Algorithm

(c) Heap Sort using Min Heap

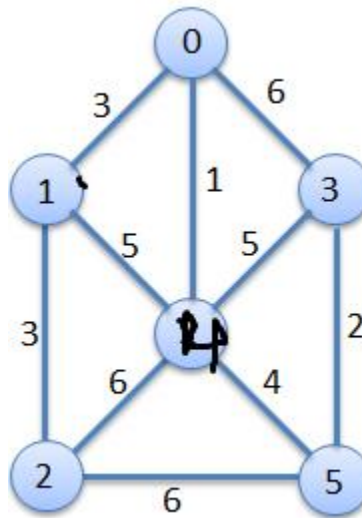
FACULTY OF ENGINEERING**B.E (I.T) III-Semester (CBCS) (Main) Examination, December, 2017****Subject : Data Structures****Time : 3 Hours****Max Marks : 70****Note: Answer all questions from Part – A & Any five questions from Part – B.****Part - A (20 Marks)**

1. Define Abstract Data Type and write Array ADT.
2. Differentiate performance analysis and performance measurement.
3. Write function to check whether a circular queue is full or not.
4. Differentiate between singly and doubly linked lists.
5. What is Sparse Matrix explain with example.
6. What is Hashing? Explain with example.
7. Differentiate Between Complete and Full Binary Tree.
8. Explain the Representation of Graphs with example.
9. Define Max Heap with example.
10. Explain About Best Computing Time For Sorting.

Part - B (50 Marks)

- 11(a) Explain Various Asymptotic Notations with examples (5+5)
- (b) Compute the best and worst case step count analysis for the following function:
- ```
int sequential search (int *a, const int n, const int x)
{ int i;
 for (i=0; i < n && a[i] != x; i++);
 if (i == n) return - 1;
 else return i ; }
```
- 12 Write a C++ function for evaluating a postfix expression. Evaluate the expression 4 5 2 \* + using the Function. Show all steps of Evaluation (10)
- 13 (a) Explain about static hashing and Hash Functions. (5+5)
- (b) Explain about Linked stacks and its operations.
- 14 Define BST. Create a binary search tree with the following keys and perform In order, preorder, postorder traversals on it (10)
- 10 12 20 32 50 55 65 80 99.
- 15 Explain Kruskal's Algorithm. Find minimum cost spanning tree for the following graph. (10)

-2-



16 Write C++ function for quick sort .Trace the algorithm for the elements 10 80 30 90 40 50.Specify its timing complexity.

(10)

17 Write short notes on the following

(5+5)

- a) Threaded Binary Trees.
- b) Summary of Internal Sorting.

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## FACULTY OF ENGINEERING

**B.E. 2/4 (Civil) I – Semester (Backlog) Examination, December 2017**  
**Subject: Building Planning and Drawing**

**Time: 3 Hours**

**Max. Marks: 75**

**Note: Answer all questions from Part A and any five questions from Part B.**

### PART-A (25 Marks)

- |                                                                      |   |
|----------------------------------------------------------------------|---|
| 1. Draw the sign convention for brick?.                              | 3 |
| 2. State the advantage of sign conventions in building drawing?      | 3 |
| 3. Define bond in brick work?                                        | 2 |
| 4. State the importance of quoin header in brick masonry?            | 3 |
| 5. How do you fix size of door and windows for residential houses?   | 2 |
| 6. Can you classify different type of roofs?                         | 3 |
| 7. How do you define tread, rise and soffit of a stair case?         | 3 |
| 8. How can you explain the purpose of providing foundation?          | 2 |
| 9. Can you define orientation of building?                           | 2 |
| 10. Why building bye laws are needed to be followed in construction? | 2 |

### PART-B (50 Marks)

- |                                                                                                                                                                                                                                              |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 11. Draw Plan, elevation and Isometric view of Flemish bond of 2 <sup>1/2</sup> brick wall                                                                                                                                                   | 10 |
| 12. Draw elevation and sectional plan of partly Paneled and glazed window of size 800 X 1200 mm. size                                                                                                                                        | 10 |
| 13. Draw Queen post truss to a span of 12000mm. Name the important parts and their standard dimensions                                                                                                                                       | 10 |
| 14. How would you classify different type of stair cases? Draw neat pictures off all type to of stairs? 10                                                                                                                                   | 10 |
| 15. Can you differentiate between wall foundation and RC column foundation? Draw neat pictures of these two types of foundations                                                                                                             | 10 |
| 16. How do you classify different principles of planning a building? Explain in detail about each type with neat sketches                                                                                                                    | 10 |
| 17. A residential building is to be planned for a doctor with the following reuirements                                                                                                                                                      | 10 |
| i. Living cum drawing hall                                                                                                                                                                                                                   |    |
| ii. Master bed room with toilet                                                                                                                                                                                                              |    |
| iii. Second bed room                                                                                                                                                                                                                         |    |
| iv. Kitchen and store                                                                                                                                                                                                                        |    |
| v. Additional bath room and W.C                                                                                                                                                                                                              |    |
| vi. Stair case and portico                                                                                                                                                                                                                   |    |
| The dimensions of the site are 15 mX 20 m and the road is on western side, Parallel to 15m side. The plinth area is not to exceed 125 sq m. A dopt moderate specifications. Draw plan sectional elevation of the building to a scale of 1.50 |    |

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## FACULTY OF ENGINEERING

B.E. 2/4 (EEE) I – Semester (Backlog) Examination, December 2017

Subject: Electrical Circuits – I

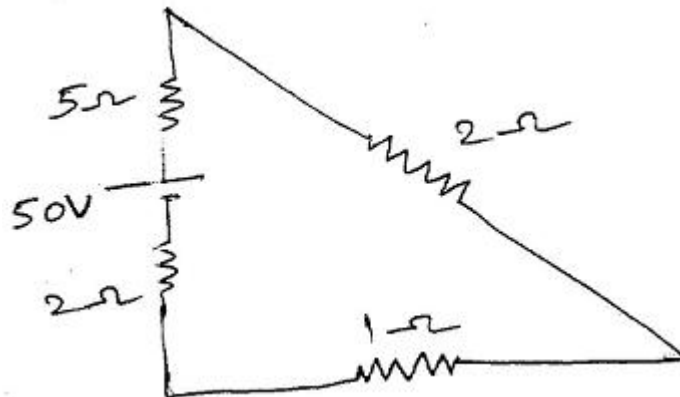
Time: 3 Hours

Max.Marks: 75

**Note: Answer all questions from Part A and any five questions from Part B.**

### PART – A (25 Marks)

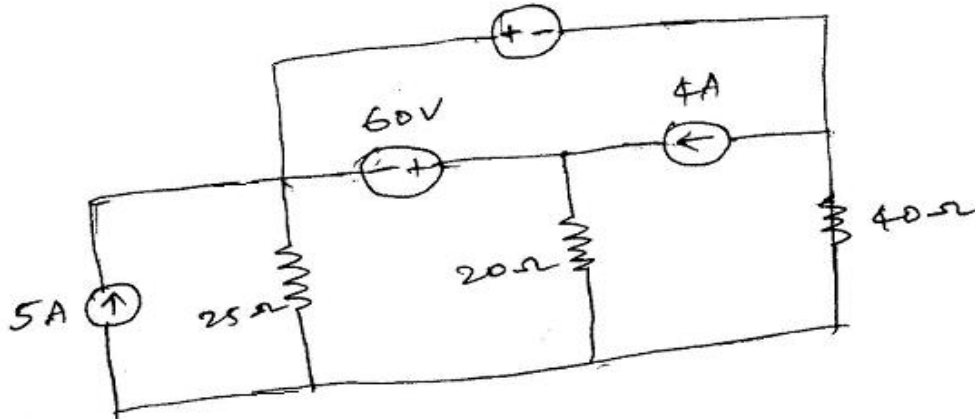
- 1 What is super mesh analysis? 2
- 2 Determine the power absorbed by each resistor in the following circuit. 3



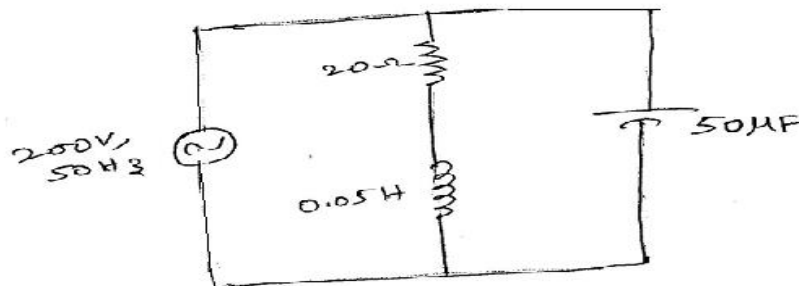
- 3 Draw the phasor diagram and impedance triangle for RL series circuit. 2
- 4 A series RL circuit with resistance  $R=25\Omega$  and inductance  $L = 0.02$  H is connected across a 250 V, 50 Hz single-phase AC supply. Calculate 3
  - i) The impedance
  - ii) Current
  - iii) Power factor and
  - iv) Power.
- 5 What is neutral shift voltage in a three phase system? 2
- 6 A balanced star-connected load of impedance  $(3+j4)$  ohms per phase is connected to a three-phase, 230V, 50 Hz supply. Find the line current and power absorbed by each phase. 3
- 7 What are the properties of incidence matrix? 2
- 8 What are the conditions for maximum power transfer in AC circuits? 3
- 9 What are the effects of series resonance? 2
- 10 Write the expression for quality factor of parallel RLC circuit. 3

## PART – B (5x10 = 50 Marks)

- 11 In the circuit shown below, find the voltage across  $25\ \Omega$  resistor and the power supplied by 5A source, by node analysis. 10

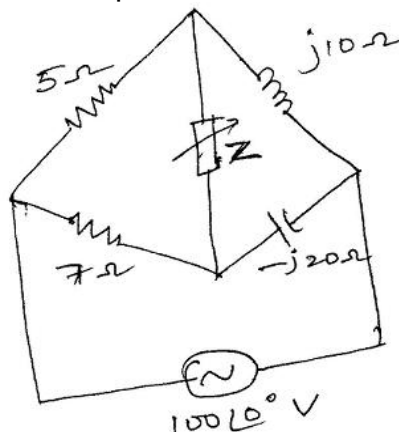


- 12 A  $50\ \mu\text{F}$  capacitor is connected in parallel with a choke coil across a 200V, 50 Hz supply as shown below. Calculate the total current, branch currents, power factor and active power of the circuit. 10



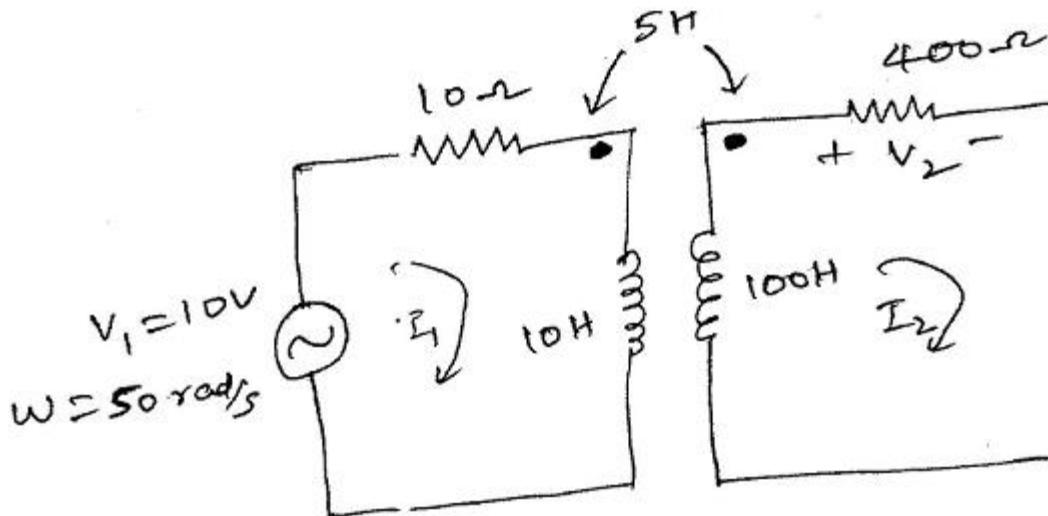
- 13 A three-phase, four-wire system having a 230 V line-to-neutral connected to an unbalanced load having phase impedances of  $(4+j6)\ \Omega$ ,  $(3+j2)\ \Omega$  and  $(5+j7)\ \Omega$ . Calculate the current in neutral wire when phase sequence is (i) RYB and (ii) RBY. 10

- 14 In the circuit shown below, determine the value of  $Z$  so that maximum power is transferred to it. Also determine the power. 10



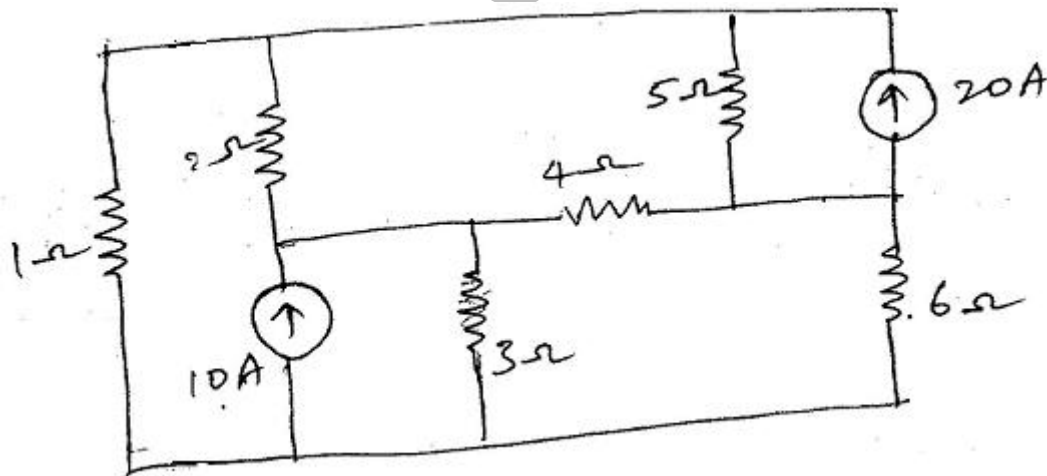
- 15 For the circuit shown in figure below, find the ratio of output voltage,  $V_2$  to input voltage  $V_1$ .

10



- 16 Determine the node voltages of the circuit shown in figure below using cut-set schedule.

10



- 17 Explain about measurement of three phase power by two-watt meter method.

10



## FACULTY OF ENGINEERING

BE 2/4 (Inst.) I Semester (Backlog) Examination, Dec, 2017

Subject : Network Theory

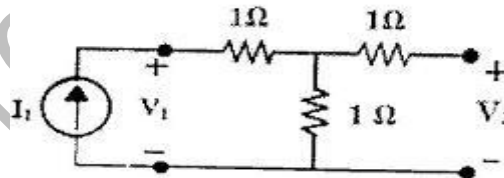
Time : 3 hours

Max. Marks : 75

**Note : Answer all questions from Part-A and Any Five Questions from Part-B**

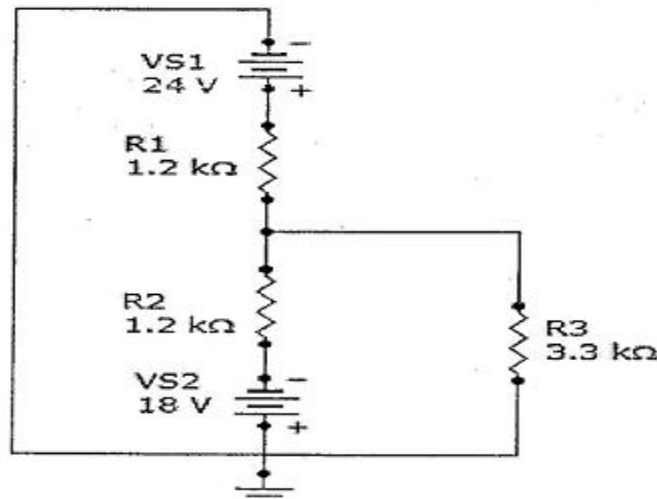
### PART – A

1. State and explain Norton's Theorem. (3M)
2. Define the terms Selectivity and Bandwidth. (3M)
3. Define and explain phase leading lagging concept. (3M)
4. How does inductor behaves under steady state condition when applied across a constant DC voltage source. (2M)
5. Define Duality. (2M)
6. Write the relation between phase and line quantities for a 3-phase star connected circuit. (2M)
7. Explain mutual induction principle. (2M)
8. Derive energy stored in inductor from basic equation. (3M)
9. Define RMS and Average value of sine wave. (2M)
10. Find  $Z_{11}$  &  $Z_{12}$  for the circuit shown below. (3M)

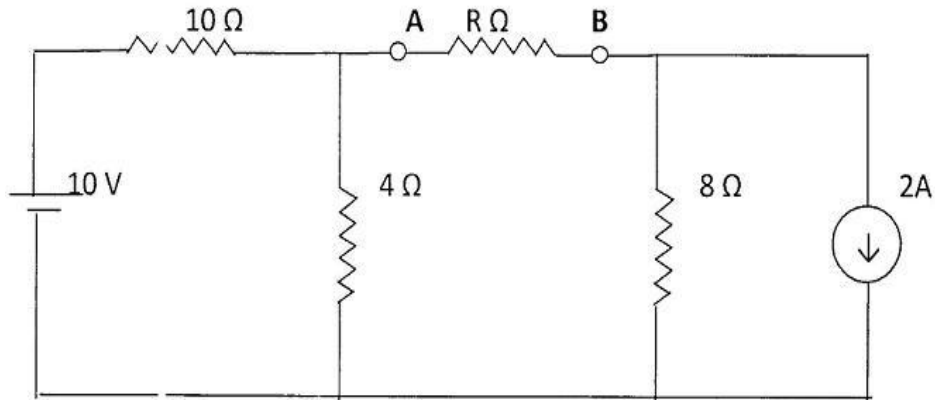


### PART – B (50 Marks)

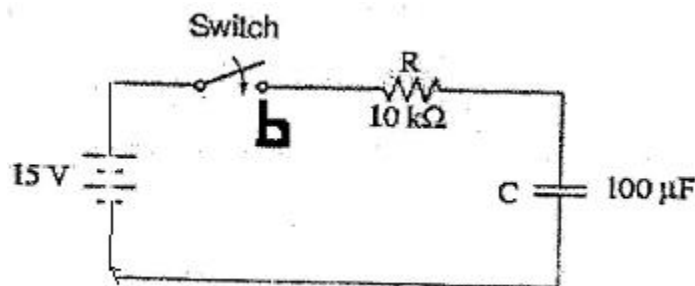
11. For the circuit shown find current in R2 using loop current method. (10M)



- 12 Find the value of  $R$  in the circuit shown such it receives maximum power; also find the value of maximum power. (10M)



13. A series connected  $R=10\ \Omega$ ,  $L=50\ \text{mH}$ ,  $C=0.1\ \mu\text{F}$  circuit is supplied with a voltage source of  $10\ \text{V}_{\text{rms}}$ ,  $100\ \text{Hz}$  frequency. Find  $Z_{\text{eq}}$ , Current, Phase angle, power factor, Average power, reactive power and voltage across each element. (10M)
14. Two coupled coils with  $L_1=0.02\text{H}$ ,  $L_2=0.01\text{H}$  &  $K=0.5$  are connected in parallel aiding & parallel opposing. Find the equivalent inductance in each way also draw their equivalent circuit connection with proper placement of dots in each case. (10M)
15. A balanced star connected load of  $(8+j6)\ \Omega$  per phase is connected to a 3- $\phi$ , 220V supply. Find the line current, power factor, real power, reactive power & apparent power. (10M)
16. In the circuit shown, the switch is moved to position b at  $t=0$ , determine the current  $i(t)$  also find  $i_c(0^+)$ . (10M)



17. Derive the equivalent two port equation for interconnection of two 2-ports connected in parallel. (10M)

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## FACULTY OF ENGINEERING

**B.E 2/4 (ECE) I – Semester (Backlog) Examination, December, 2017**

**Subject : Electromagnetic Theory**

**Time : 3 Hours**

**Max Marks : 75**

**Note: Answer all questions from Part – A & Any five questions from Part – B.**

### Part - A (25 Marks)

1. A closed surface is defined in spherical coordinates  
 $3 < r < 5, 0.1\pi < \theta < 0.3\pi, 1.2\pi < \phi < 1.6\pi$  Find the volume enclosed. (2)
2. State and briefly discuss the basic definition of the curl of a vector (2)
3. Point charges 1m C and -2mC are located at (3, 2, -1) and (-1, -1, 4) respectively  
 Calculate the electric force on a 10nC charge located at (0, 3, 1) and the electric field  
 Intensity at that point. (3)
4. State Gauss's law Under what conditions is Gauss's law especially useful in  
 determining the electric field intensity of a charge distribution? (3)
5. What is the basis for Magnetic Scalar Potential? (2)
6. State stoke's theorem (2)
7. List out the generalized forms of Maxwell's Equations in Integral form for The Time  
 Varying fields. (4)
8. The Electric field of a plane electromagnetic wave travelling in a nonmagnetic, non-  
 conducting medium is given by  $E = 5 \cos (10^9t + 30z) a_x$ . What is the dielectric constant of  
 the medium. (2)
9. What is loss tangent? Discuss its significance (2)
10. A Uniform Plane Wave incident normally on a plane surface of a Dielectric material is  
 reflected with a VSWR of 3. Calculate the percentage of incident power that is reflected. (3)

### PART - B (50 Marks)

11. a) Point charges  $Q_1$  and  $Q_2$  are respectively located at (4, 0, -3) and (2, 0, 1) if  $Q_2 = 4nc$ ,  
 Find  $Q_1$  such that (5)
  - i) The E at (5, 0, 6) has No Z - Component
  - ii) The force on a Test charge at ( 5, 0, 6) has No X – Component
- b) Obtain a formula for the electric field intensity on the axis of a circular disk of radius  
 'b' that carries a uniform surface charge density  $P_s$  (5)
- 12 a) A Point charge 5nc is located at (-3, 4, 0) while line  $y = 1, z = 1$  carries uniform charge  
 2nc,  
  - i) If  $V = 0V$  at O (0, 0, 0), Find V at A (5, 0, 1)
  - ii) If  $V = 100V$  at B ( 1, 2, 1) Find V at C (-2, 5, 3) (6)
- b) Derive the Expression for The Energy Density in Electrostatic Field (4)

- 13 a) Find the magnetic field intensity at the center of a square loop, with side 'w' Carrying a direct current 'I'. (4)  
b) Obtain the vector magnetic potential due to a long straight conducting wire carrying a current 'I' in + z direction (6)
- 14 a) Determine the capacitance per unit length between two long parallel, circular wires of radius 'a'. The axes of the wires are separated by a distance 'd'. (5)  
b) Derive the Equation of Continuity (5)
- 15 a) From the Maxwell's curl's equation derive the wave equations for an Electromagnetic wave in conducting media (5)  
b) In a medium  $E = 16 e^{-x/20} \sin (2 \times 10^8 t - 2x) j_z$  V/m. Find the direction of propagation, the propagation constant, wavelength, speed of the wave and skin depth (5)
- 16 a) State and prove poynting Theorem. (5)  
b) Discuss the determination of the reflected and transmitted wave fields of a uniform plane wave incident normally onto a plane boundary between two material media. (5)
- 17 a) What is Lorentz's condition and show that time varying Electric scalar potential and magnetic vector potential satisfy wave equations if Lorentz's condition is assumed. (6)  
b) Write Maxwell's equations in Differential and Integral form for Time varying Conditions. (4)

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## FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) I - Semester (Main) Examination, December 2017

Subject : Mechanics of Materials

Time : 3 Hours

Max. Marks: 75

**Note: Answer all questions from Part-A and answer any five questions from Part-B.**

### PART – A (25 Marks)

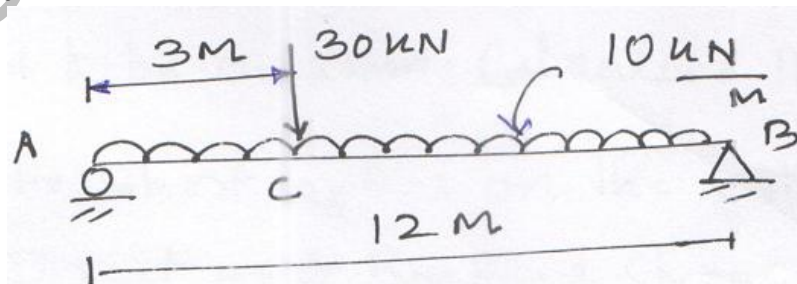
- 1 Define Hardness and Stiffness. (2)
- 2 Write demerits of Mohr's circle of stresses. (2)
- 3 Write the relation between shear force, BM and intensity of loading. (2)
- 4 Write small notes on flexural rigidity. (2)
- 5 Explain slope and deflection. (2)
- 6 Difference between closely coiled and open coiled helical spring. (3)
- 7 Write the relation between longitudinal shear stress and lateral shear stress. (3)
- 8 Write down importance of compound cylinders. (3)
- 9 Explain Kern of the section. (3)
- 10 Find sectional modulus of a circular section of dia 400 mm. (3)

### PART – B (50 Marks)

- 11 Derive pure torsion equation

$$\frac{T}{J} = \frac{\bar{C}}{r} = \frac{C_r}{\ell}$$

- 12 Draw SFD and BMD



- 13 A simply supported beam of span 16M carries a point of 10kN at a distance of 4M from left support. Find max deflection of the beam in terms of EI by using fundamentals of Macaulay's method.
- 14 A T-section beam with 100 mm x 10 mm flange and 150mm x 15 mm web is simply supported and subjected to a UDL of 10 kN/M over its entire span 8M. Draw the variation of shear stress across the depth of the beam at the supports and obtained max shear stress at the section.

..2..

- 15 A hollow alloy tube 5M long with external and internal diameter 30 mm and 25 mm was found to extend by 4.3 mm, under a tensile load of 40 kN. Find the critical load for the tube when used as a column with one end fixed and other end free. Also find the safe load for the tube with a factor of safety of 4.
- 16 (a) Sketch the stress and strain curve for Brittle material. Explain all the salient points on it.
- (b) In a tension test on a circular rod 60 mm diameter and 200 mm gauge Length. The elongation recorded was 0.6mm. The decrease in diameter was found to be 0.22mm. Calculate the three elastic Constants.
- 17 Write short notes on the following:
- (a) Direct and bending stress
  - (b) Theory of pure bending
  - (c) Second and Perry's formula

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**FACULTY OF ENGINEERING****B.E. 2/4 (CSE) I – Semester (Backlog) Examination, December 2017****Subject: Data Structures Using C++****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (25 Marks)**

- |    |                                                                                                         |   |
|----|---------------------------------------------------------------------------------------------------------|---|
| 1  | Define ADT. Give example.                                                                               | 2 |
| 2  | When do use sparse matrix? Give benefits.                                                               | 3 |
| 3  | What is a amazing problem? Which Data Structure is used?                                                | 3 |
| 4  | Write about sub-typing. Give example.                                                                   | 2 |
| 5  | Define equivalence class.                                                                               | 2 |
| 6  | Why do we need circular lists?                                                                          | 3 |
| 7  | Describe static hashing.                                                                                | 2 |
| 8  | Differentiate between a binary tree and threaded binary tree.                                           | 3 |
| 9  | When do you prefer internal sorting and what are the metrics taken into consideration for fast sorting? | 3 |
| 10 | List various graph traversal techniques.                                                                | 2 |

**PART – B (50 Marks)**

- |       |                                                                                 |    |
|-------|---------------------------------------------------------------------------------|----|
| 11 a) | Write about performance analysis and measurement.                               | 4  |
| b)    | Derive the time complexity for quick sort worst case and best case.             | 6  |
| 12    | Define template, using template implement stack data structure.                 | 10 |
| 13 a) | Write insert and delete operations in DLL (Double Linked Lists) using C++ code. | 6  |
| b)    | Compare single linked list and chain.                                           | 4  |
| 14 a) | Construct AVL tree using following:                                             | 5  |
|       | 3 2 15 10 28 18 4 14 30 9 21 26                                                 |    |
| b)    | Write the properties of B-Tree. How insertion and deletion are done.            | 5  |
| 15 a) | How does heap sort work give its time complexity for best and worst cases.      | 5  |
| b)    | Differentiate DFS and BFS.                                                      | 5  |
| 16 a) | How does sorting on several keys work.                                          | 4  |
| b)    | How do copy binary tree show it using example code.                             | 6  |
| 17    | Differentiate Prim's and Kruskal's algorithms with example.                     | 10 |

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**FACULTY OF INFORMATICS****B.E. 2/4 (IT) I-Semester (Backlog) Examination, December 2017****Subject : Micro Electronics****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A and any FIVE questions from Part-B.****PART – A (25 Marks)**

- |    |                                                                          |   |
|----|--------------------------------------------------------------------------|---|
| 1  | Draw the circuit symbols of PN junction diode, Zener diode and LED.      | 2 |
| 2  | Briefly explain the principle of operation of a Varactor diode.          | 3 |
| 3  | Differentiate between BJT and FET.                                       | 3 |
| 4  | What are different modes of operation of BJT?                            | 2 |
| 5  | Derive the expression for voltage gain of a negative feedback amplifier. | 3 |
| 6  | List the four basic feedback topologies.                                 | 2 |
| 7  | List the ideal characteristics of an operational amplifier.              | 3 |
| 8  | Draw the circuit for comparator using Op-amp.                            | 2 |
| 9  | What is noise margin?                                                    | 2 |
| 10 | What are PUN and PDN?                                                    | 3 |

**PART – B (50 Marks)**

- |    |                                                                                                                                               |    |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------|----|
| 11 | a) Explain the operation of a full wave bridge rectifier.                                                                                     | 6  |
|    | b) Explain the operation of Zener diode in reverse bias condition.                                                                            | 4  |
| 12 | Explain the input and output characteristics of BJT in CB and CE configuration and compare them.                                              | 10 |
| 13 | a) Discuss the properties of negative feedback in amplifiers.                                                                                 | 6  |
|    | b) Explain the operation of Hartley oscillator.                                                                                               | 4  |
| 14 | Explain the function of Op-amp as<br>a) Adder                      b) Integrator                                                              | 10 |
| 15 | Implement the following using CMOS logic and explain.<br>a) 2 input AND gate              b) 2-input OR gate              c) 2-input XOR gate | 10 |
| 16 | a) Explain the use of PN diode in the limiting circuit.                                                                                       | 5  |
|    | b) Explain the working of MOSFET.                                                                                                             | 5  |
| 17 | Write short notes on the following:<br>a) Class-B power amplifier<br>b) CMOS inverter                                                         | 10 |

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