

CODE: 23ECT101 **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Regular & Supplementary Examinations, June , 2025
ELECTRONIC DEVICES AND CIRCUITS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

| | | <u>UNIT-I</u> | Marks | CO | BTL |
|-----|----|---|-------|----|-----|
| 1. | a) | Explain the working principle of a Varactor diode with a neat diagram | 7 | 1 | 2 |
| | b) | Describe the construction and operation of a Tunnel diode. | 7 | 1 | 2 |
| | | (OR) | | | |
| 2. | a) | Discuss the advantages and applications of Zener diodes in voltage regulation | 7 | 1 | 3 |
| | b) | Explain the principle of working of a Photo Diode. | 7 | 1 | 2 |
| | | <u>UNIT-II</u> | | | |
| 3. | a) | Describe the working of a bridge rectifier and compare it with a center-tapped full-wave rectifier. | 8 | 2 | 4 |
| | b) | Discuss the necessity and functioning of capacitor filters in rectifier circuits. | 6 | 2 | 2 |
| | | (OR) | | | |
| 4. | a) | Derive the expression for ripple factor of an LC filter. | 7 | 2 | 5 |
| | b) | Explain the importance of voltage regulation in rectifier circuits. | 7 | 2 | 2 |
| | | <u>UNIT-III</u> | | | |
| 5. | a) | Explain the characteristics of a BJT in Common Collector configuration | 10 | 3 | 2 |
| | b) | Discuss the importance of early effect in transistor operation | 4 | 3 | 3 |
| | | (OR) | | | |
| 6. | a) | Compare the working principles of depletion-mode and enhancement-mode MOSFETs | 7 | 3 | 4 |
| | b) | Explain the role of pinch-off voltage in JFET operation | 7 | 3 | 2 |
| | | <u>UNIT-IV</u> | | | |
| 7. | a) | Describe the working of collector-to-base biasing and its significance | 6 | 4 | 2 |
| | b) | Derive the stability factor for a fixed bias circuit. | 8 | 4 | 5 |
| | | (OR) | | | |
| 8. | a) | Explain the concept of thermal stability in transistors. | 7 | 4 | 2 |
| | b) | Explain the self- bias circuit. | 7 | 4 | 4 |
| | | <u>UNIT-V</u> | | | |
| 9. | a) | Determine the current gain, voltage gain, input resistance, and output resistance for a common- emitter hybrid model circuit. | 7 | 5 | 5 |
| | b) | Compare all transistor configurations in terms of A_v , A_i , R_i , R_o , A_{vs} , A_{is} . | 7 | 5 | 4 |
| | | (OR) | | | |
| 10. | a) | Draw the two port network diagram and derive the necessary equations | 7 | 5 | 2 |
| | b) | Derive the current gain, voltage gain, input resistance, and output resistance for a simplified CE hybrid model circuit. | 7 | 5 | 4 |

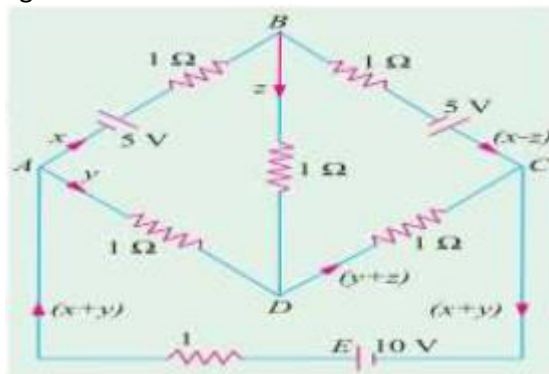
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

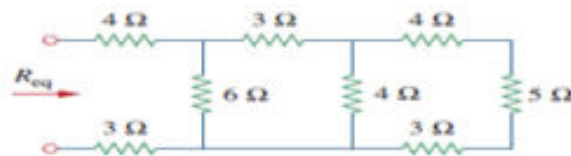
UNIT-I

- | | Marks | CO | Blooms Level |
|--|-------|----|---------------|
| 1. a) Describe dependent and independent sources with examples. | 6 | 1 | Understanding |
| b) State Kirchhoff's laws. Determine unknown currents for the circuit shown in Figure. | 8 | 1 | Applying |



(OR)

- | | | | |
|---|---|---|---------------|
| 2. a) Illustrate faraday's laws of electromagnetic induction. | 6 | 1 | Understanding |
| b) Find the Req for the circuit shown in below figure. | 8 | 1 | Applying |

UNIT-II

- | | | | |
|--|---|---|-----------|
| 3. a) Analyze the behaviour of AC through R-C series circuit with relevant waveforms and phasor diagram. | 7 | 2 | Analyzing |
| b) An alternating voltage is given by $V=230\sin 314t$. Calculate i) frequency, ii) maximum value, iii) average value, iv) RMS value. | 7 | 2 | Applying |

(OR)

- | | | | |
|--|---|---|---------------|
| 4. a) Derive the average value, peak value, form factor for a sine waveform. | 6 | 2 | Understanding |
| b) A capacitor having a capacitance of $79.5\mu\text{F}$ is connected in series with non-inductive resistance of 30Ω across 100V, 50Hz supply. Calculate (i) Impedance (ii) RMS current (iii) Phase angle (iv) Equations for instantaneous values of voltage and current. | 8 | 2 | Applying |

UNIT-III

- | | | | |
|---|---|---|---------------|
| 5. a) Explain the constructional details of DC generator with neat sketch and explain the function of major parts. | 6 | 3 | Understanding |
| b) A 4 pole lap wound DC generator has no-load generated e.m.f. of 500 V at 1200 rpm. Calculate the flux per pole if the armature has 120 slots with 6 conductors per slot. | 8 | 3 | Applying |

(OR)

- | | | | |
|---|---|---|---------------|
| 6. a) Describe the operation of 3 point starter with neat sketch. | 7 | 3 | Analysing |
| b) Illustrate different speed control methods for DC shunt motor. | 7 | 3 | Understanding |

UNIT-IV

- | | | | | | |
|----|----|---|---|---|---------------|
| 7. | a) | Explain the working of a Zener diode as a voltage regulator | 7 | 4 | Understanding |
| | b) | Explain the working of diode as a switch. | 7 | 4 | Analyzing |

(OR)

- | | | | | | |
|----|----|---|---|---|---------------|
| 8. | a) | Draw and explain the V-I characteristics of a PN junction diode. | 7 | 4 | Understanding |
| | b) | Explain the Concept of Zener Breakdown and its V-I characteristics. | 7 | 4 | Understanding |

UNIT-V

- | | | | | | |
|----|----|---|---|---|---------------|
| 9. | a) | Explain about the transistor (BJT) operation | 7 | 5 | Analysing |
| | b) | Explain the construction & working of depletion MOSFET and enhancement MOSFET with its necessary characteristics curve. | 7 | 5 | Understanding |

(OR)

- | | | | | | |
|-----|----|--|---|---|---------------|
| 10. | a) | Sketch the input and output characteristics of BJT under CB configuration. | 7 | 5 | Understanding |
| | b) | Explain the operation of a JFET with diagram. | 7 | 5 | Remebering |

Answer ONE Question from each Unit

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UNIT-IMarks CO Blooms
Level

1. a) The following forces act at a point:
 (i) 20 N inclined at 30° towards North of East,
 (ii) 25 N towards North,
 (iii) 30 N towards North West, and
 (iv) 35 N inclined at 40° towards South of West.
 Find the magnitude and direction of the resultant force.

[10M] CO1 L2

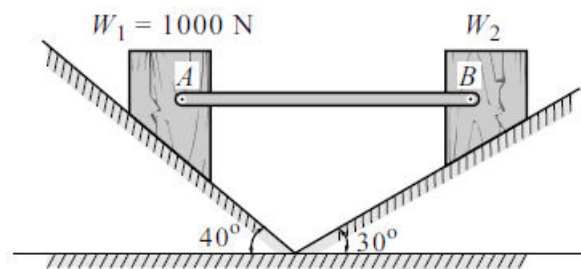
- b) State and prove parallelogram law.

[4M] CO1 L2

(OR)

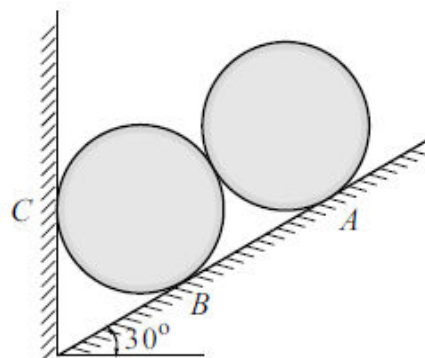
2. Two blocks W_1 and W_2 , resting on two inclined planes, are connected by a horizontal bar AB, as shown in Fig. If W_1 equals 1000 N, determine the maximum value of W_2 for which the equilibrium can exist. The angle of limiting friction is 20° at all rubbing faces.

14M CO1 L4

UNIT-II

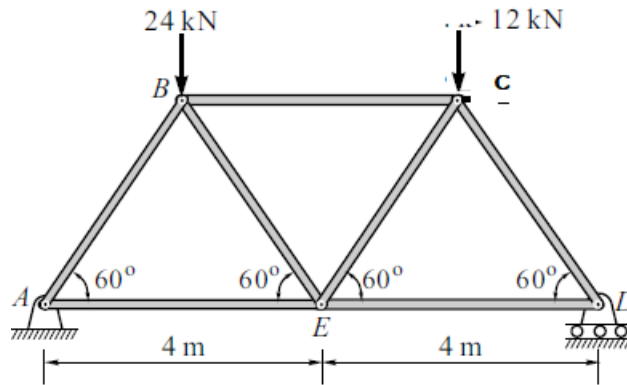
3. Two identical rollers each of mass 50 kg are supported by an inclined plane and a vertical wall as shown in Fig. Assuming smooth surfaces, find the reactions induced at the point of support A, B and C.

14M CO2 L4



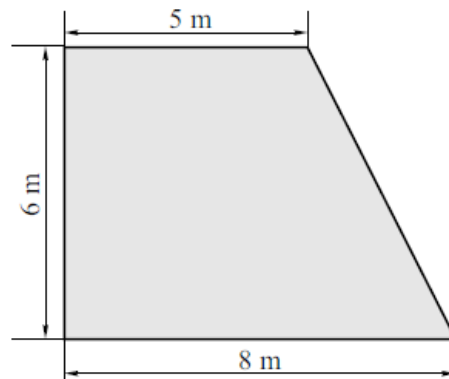
(OR)

4. Determine the forces in the members of the truss as shown in Fig. 14M CO2 L4



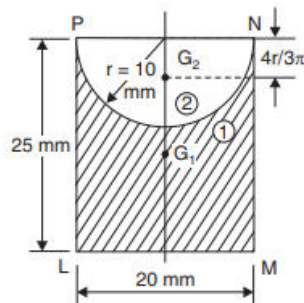
UNIT-III

5. Determine the centroid of the shaded area in Fig. 14M CO3 L4



(OR)

6. Determine the moment of inertia of the shaded area about the edge LM as shown in Figure. 14M CO3 L4

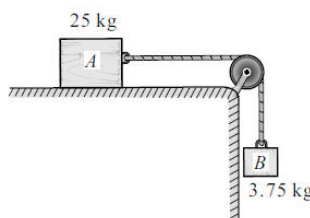


UNIT-IV

7. A burglar's car had a start with an acceleration 2 m/s^2 . A police vigilant came in a van to the spot at a velocity of 20 m/s after 3.75 seconds and continued to chase the burglar's car with uniform velocity. Find the time in which the police van will overtake the burglar's car. 14M CO4 L3

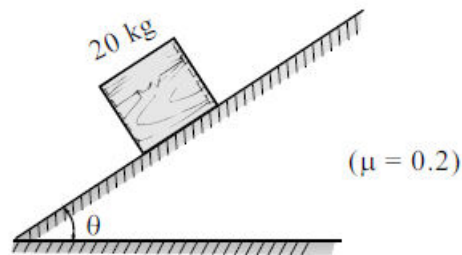
(OR)

8. A body of mass 25 kg resting on a horizontal table is connected by string passing over a smooth pulley at the edge of the table to another body of mass 3.75 kg and hanging vertically, as shown in Fig. Initially, the friction between 25 kg mass and the table is just sufficient to prevent the motion. If an additional 1.25 kg is added to the 3.75 kg mass, find the acceleration of the masses. 14M CO4 L4



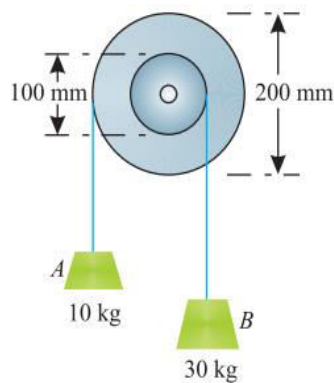
UNIT-V

9. A mass of 20 kg is projected up an inclined of 26° with velocity of 4 m/s, as shown in Fig. If $\mu = 0.2$, (i) find maximum distance that the package will move along the plane and (ii) What will be the velocity of the package when it comes back to initial position? 14M CO5 L4



(OR)

10. Two bodies A and B of masses 30 kg and 10 kg are tied to the two ends of a light string passing over a pulley of radius of gyration as 70 mm and mass 4 kg as shown in figure. Determine the acceleration of falling weight 14M CO5 L4



Answer ONE Question from each Unit

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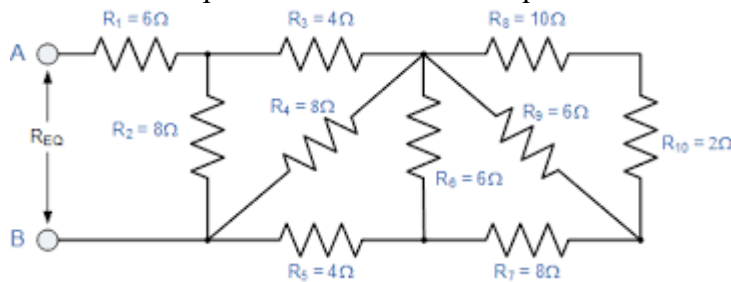
All parts of the Question must be answered at one place

UNIT-I

1. a) Define the following (i) Resistance (ii) Voltage (iii) Current
b) Use series and parallel reduction technique find the R_{AB} .

5M

5M

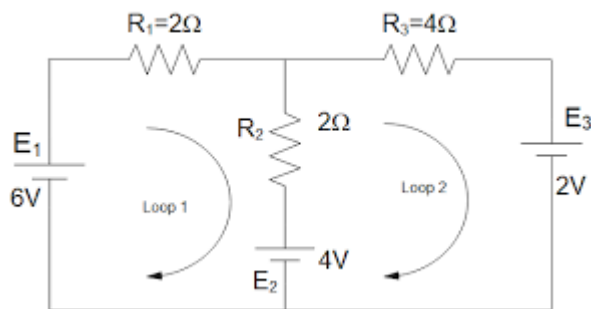


(OR)

2. a) State and explain Kirchhoff's laws.
b) Find current flowing through 4 Ω resistor.

5M

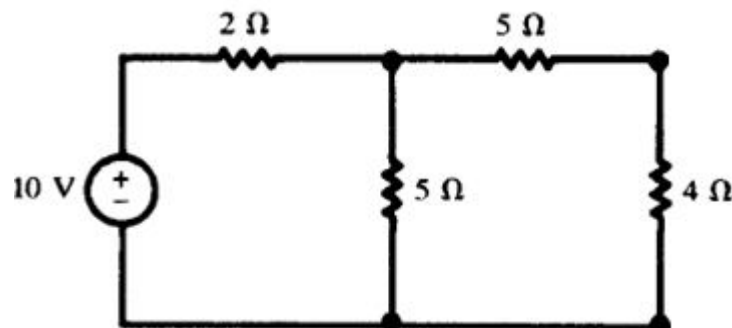
5M

**UNIT-II**

3. a) Explain the delta-star transformation
b) Using mesh analysis find current through 4Ω resistor.

5M

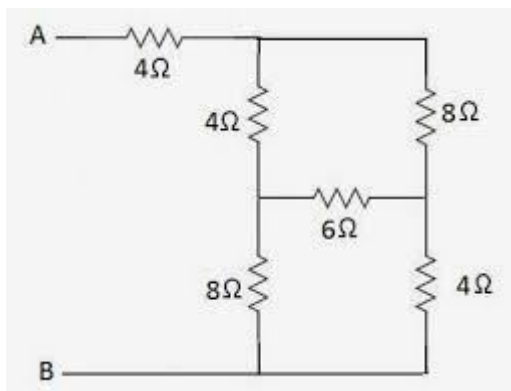
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(OR)

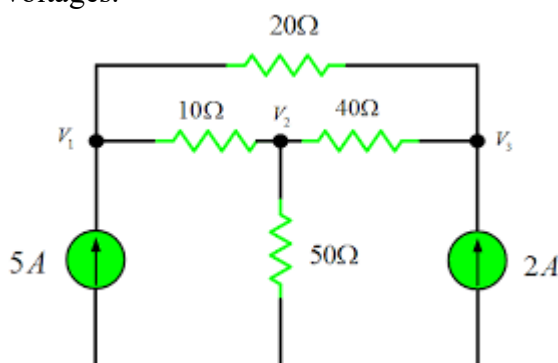
4. a) Find R_{AB}

5M



b) Calculate the nodal voltages.

5M



UNIT-III

5. a) Define the following i) wave form (ii) form factor (iii) Peak factor

5M

b) A series RC circuit with $R = 50 \Omega$ and $C = 2 \mu F$ is connected to a 30 V RMS, 50Hz supply. Determine the circuit current, the resistor voltage, the capacitor voltage and the phase angle of the current with respect to the supply voltage.

5M

(OR)

6. Derive the expression for average and RMS value of sine wave.

10M

UNIT-IV

7. a) Define the following i) magnetic flux ii) flux density iii) Magnetic Circuit.

5M

b) Compare between magnetic and electrical circuits.

5M

(OR)

8. a) Derive the Expression for co-efficient of coupling k in magnetic circuits.

5M

b) Define the following i) reluctance ii) magneto motive force iii) magnetic field intensity.

5M

UNIT-V

9. a) Derive the EMF equation of DC Generator

5M

b) Explain the principle operation of DC Generator.

5M

(OR)

10. a) Explain the construction of a DC machine with a neat sketch

5M

b) Discuss various losses of DC machine.

5M

UNIT-VI

11. a) Derive the Torque Equation of DC Motor .

5M

b) Explain the working of 3-point starter with a neat sketch.

5M

(OR)

12. a) List out the application of DC Motors.

5M

b) Explain the various speed control methods of DC Motors.

5M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I B. Tech II Semester Supplementary Examinations, June, 2025****Programming for Problem Solving
(Common to Civil, ECE and EEE Branches)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain the various components of a computer system. **5M**
b) Write a C program to find the area of a triangle when its sides are given. **5M**
(OR)
2. a) Explain type casting with an example program. **5M**
b) Write a C program to read a lowercase character and convert it to uppercase. **5M**

UNIT-II

3. a) Compare and contrast the 'while' and 'do-while' loops in C with examples. **5M**
b) Write a C program to find the roots of a quadratic equation. **5M**
(OR)
4. a) Explain the working of switch-case statements with an example program. **5M**
b) Write a C program to generate the Fibonacci series using a loop. **5M**

UNIT-III

5. a) Explain the different types of arrays in C with examples. **5M**
b) Write a C program to multiply two matrices. **5M**
(OR)
6. a) Differentiate between call by value and call by reference with example program. **5M**
b) Write a C program to find the largest and smallest number from a list of elements. **5M**

UNIT-IV

7. a) Explain different types of functions in C with examples. **5M**
b) Write a C program to find the factorial of a number using recursion. **5M**
(OR)
8. a) Explain how arrays can be passed to functions with an example program. **5M**
b) Explain different types of storage classes in C with examples. **5M**

UNIT-V

9. a) Differentiate between structures and unions with an example program. **5M**
b) Write a C program to demonstrate an array of structures. **5M**
(OR)
10. a) Explain self-referential structures with an example. **5M**
b) Write a C program to access structure members using a pointer. **5M**

UNIT-VI

11. a) Explain different file opening modes in C. **5M**
b) Write a C program to copy the contents of one file to another. **5M**
(OR)
12. a) Write a C program to count the number of characters, words, and lines in a file. **5M**
b) Explain any four preprocessor directives with examples. **5M**

AR18

CODE: 18EST102

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B. Tech II Semester Supplementary Examinations, June,2025

**Programming for Problem Solving
(Common to EEE and ME Branches)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Define Algorithm. Write the Characteristics of an algorithm. Write an algorithm to find whether given number is even or odd. 7M
- b) Explain Structure of C program with an example 5M
- (OR)**
2. a) Explain about arithmetic and logical operators in c language. 6M
- b) Evaluate the following expression $(a+b)*c+d*e/f$ where $a=b=c=2$, $d=3$, $e=1$, $f=1$ 6M

UNIT-II

3. a) Explain about selection statements in c language 6M
- b) Write a C program to find whether given number is prime or not 6M
- (OR)**
4. a) Differentiate between entry control and exit control loops with examples. 6M
- b) Write a C program to print the roots of quadratic equation using nested if-else statement 6M

UNIT-III

5. a) Write about declaration and accessing of Two-Dimensional arrays with suitable example. 6M
- b) Write a C program to find power of two numbers using functions 6M
- (OR)**
6. a) Explain about storage classes in C 6M
- b) Write a C program to find sum of elements in a 1-D Array 6M

UNIT-IV

7. a) Explain about Dynamic Memory Allocation with an example program? 6M
- b) Explain about pointer Arithmetic. 6M
- (OR)**
8. a) What is an array of pointers and pointers to an array? Summarize the difference between both of them. 6M
- b) Explain parameter passing techniques with suitable examples. 6M

UNIT-V

9. a) What is structure? How to declare, initialization of a structure, accessing a structure elements with examples. 6M
- b) Explain file-handling functions available in 'C' with suitable examples. 6M
- (OR)**
10. a) Distinguish between Structure and Union 6M
- b) Write a C program to copy the content of one file into another? 6M

AR18

CODE: 18EST101

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, June, 2025

**Basic Electrical Engineering
(Common to CE, CSE and IT Branches)**

Time: 3 Hours

Max Marks: 60

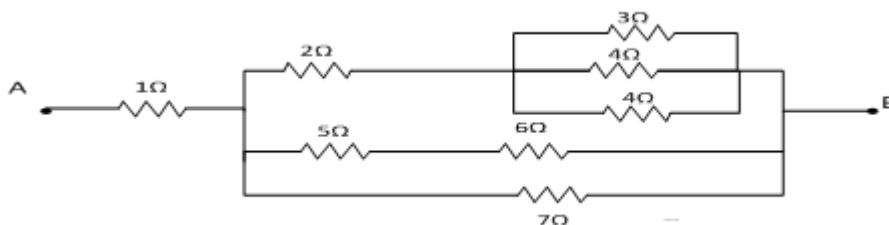
Answer ONE Question from each Unit

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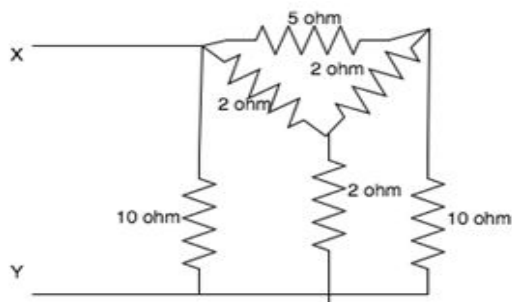
UNIT-I

1. a) State and explain Kirchhoff Voltage Law with example. 6M
- b) Determine the equivalent resistance between the two points A and B shown in figure 6M



(OR)

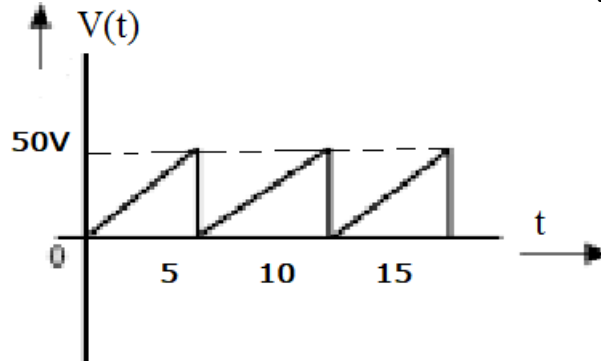
2. a) Find the equivalent resistance between the terminals X and Y by using star-delta transformation technique. 8M



- b) Explain Ohm's law with its limitations. 4M

UNIT-II

3. a) Define the following 6M
(i) frequency (ii) cycle (iii) RMS value (iv) average value (v) form factor and (vi) peak factor of an alternating quantity.
b) Find the RMS value of the Saw-tooth wave form shown in Figure 6M



(OR)

4. a) A circuit contains two impedances $Z_1 = (3 + j4) \Omega$ and $Z_2 = (5 - j9) \Omega$ in series and connected to 50V, 50 Hz supply. Determine the current through the impedances and voltage across each impedance. Also find the power factor of the circuit. 6M
b) Determine current passing through RC series circuit for supply voltage of $v = v_m \sin \omega t$ using sinusoidal analysis 6M

UNIT-III

5. a) Derive the EMF equation of a DC generator. 6M
b) What is OCC characteristic of a shunt generator? Explain. 6M

(OR)

6. a) Distinguish between internal and external characteristics of a DC generator. 6M
b) What are the different types of DC motors? Mention the application of each motor. 6M

UNIT-IV

7. Explain the working principle and construction of single phase transformer. 12M

(OR)

8. a) Explain various losses of a transformer. 6M
b) A single phase transformer is connected to a 230V, 50Hz supply. The net cross sectional area of the core is 60 cm^2 . The number of turns in primary is 500 and in the secondary is 1000. Determine (i) transformation ratio (ii) emf induced in the secondary winding (iii) maximum flux density in the core 6M

UNIT-V

9. Explain construction and working principle of 3 phase induction motor 12M

(OR)

10. a) Explain torque-slip characteristic of three-phase induction motor. 6M
b) Three phase induction motor is wound for 4-poles and is supplied from 400V, 50Hz supply. Calculate (i) synchronous speed (ii) speed of the motor when the slip is 2% and (iii) the rotor frequency 6M

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a. Write the difference in the responses of an inductive and a capacitive network? 7M
- b. Two resistors are connected in parallel across 200V supply take 10A from the mains. If the power dissipated in one resistor is 800W, then determine the value of the other resistor? 7M

(OR)

2. a. State and explain KVL and KCL. 6M
- b. Explain the star-delta transformation. 8M

UNIT-II

3. a. Derive EMF equation of DC generator? 7M
- b. A 220-V d.c. machine has an armature resistance of $0.5\ \Omega$. If the full-load armature current is 20 A, find the induced e.m.f. when the machine acts as (i) generator (ii) motor? 7M

(OR)

4. a. What are the different types of dc generators based on the way of excitation? 7M
- b. Draw and Explain the Internal and External Characteristics of DC Generator. 7M

UNIT-III

5. a. Explain how the OC and SC tests are conducted on a Transformer? 7M
- b. Draw and explain the equivalent circuit of a transformer. 7M

(OR)

6. a. Draw and explain the torque slip characteristics of an induction motor? 7M
- b. Explain the principle of operation of 3-phase induction motor. 7M

UNIT-IV

7. a. Explain how the regulation of an alternator is determined by the synchronous impedance method? 7M
- b. List the merits and demerits of MI instruments? 7M

(OR)

8. a. Describe the construction and working of PMMC Instrument 7M
- b. Explain the working of attraction type Moving iron Instrument 7M

UNIT-V

9. a. Explain the working of half-wave rectifier with neat waveforms 7M
- b. An a.c. supply of 230 V is applied to a half-wave rectifier circuit with a load of 10ohms. Assume the diode to be ideal, Find (i) The output voltage, (ii) the peak inverse voltage and (iii) Load current. 7M

(OR)

10. a. Explain the working of a NPN transistor 7M
- b. Explain the CB configurations of a transistor. 7M