

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

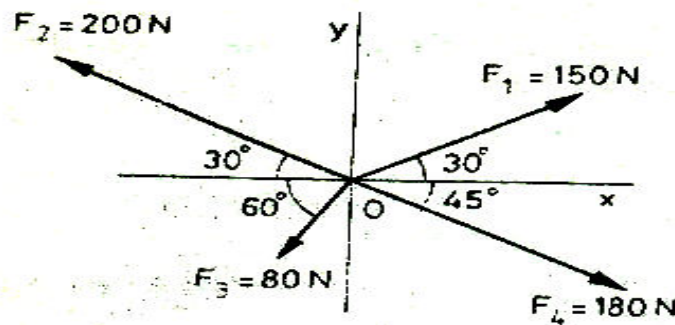
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

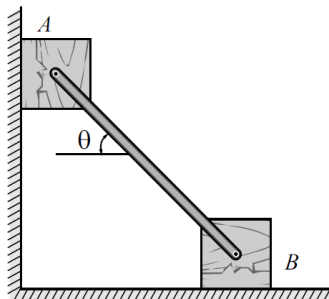
Marks	CO	Blooms Level
14M	CO1	L4

1. Determine the resultant, both in magnitude and direction, of the forces acting on the body as shown in Figure.

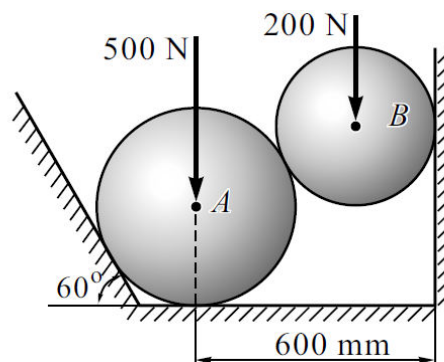


(OR)

2. Two identical blocks A and B are connected by a rod and rest against vertical and horizontal planes, respectively, as shown in Fig. If sliding impends when $\theta = 45^\circ$, determine the coefficient of friction μ , assuming it to be the same at both floor and wall.

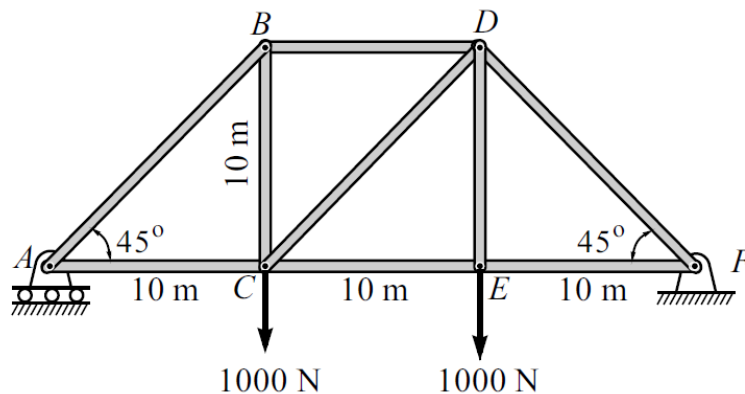
UNIT-II

3. Two spheres, A and B, are resting in a smooth trough as shown in Fig. Draw the free body diagrams of A and B showing all the forces acting on them, both in magnitude and direction. Radius of spheres A and B are 250 mm and 200 mm, respectively.



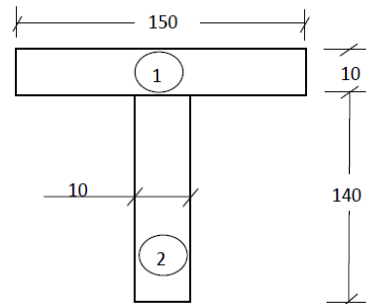
(OR)

4. A simple plane truss is shown in Fig. Two 1000 N loads are shown acting on pins C and E. Determine the force in all the members using method of joints. 14M CO2 L4



UNIT-III

5. Determine the centroid of T-Section as shown in Figure. All dimensions are in mm. 14M CO3 L4



(OR)

6. Derive the mass moment of inertia of a solid right circular cone of base radius R and height h with respect to its geometric axis of rotation. 14M CO3 L2

UNIT-IV

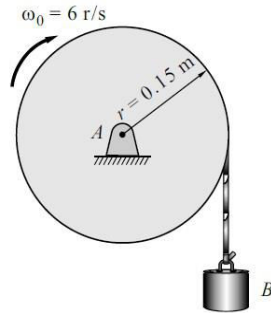
7. A motorist is travelling at 90 kmph, when he observes a traffic light 250 m ahead of him turns red. The traffic light is timed to stay red for 12 sec. If the motorist wishes to pass the light without stopping, just as it turns green. Determine (i) The required uniform deceleration of the motor and (ii) the speed of the motor as it passes the traffic light 14M CO4 L2

(OR)

8. Motion of a particle along a straight line is given by the equation $a = t^2 - 2t + 2$, where a =Acceleration in m/s^2 & t = time in seconds after 1 second the distance travelled by the particle & velocity of the particle were found to be 14.75 m & 6.33 m/s. Find the (i) Distance travelled (ii) Velocity (iii) Acceleration of the particle after 2 seconds. 14M CO4 L4

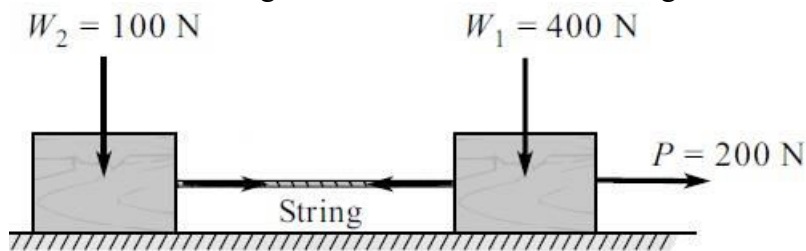
UNIT-V

9. A motor gives disk A an angular acceleration of $\alpha_A = (0.6t^2 + 0.75)$ rad/s², where t is in seconds. If the initial angular velocity of the disk is $\omega_0 = 6$ rad/s, determine the magnitude of the velocity and acceleration of block B when $t = 2$ sec . 14M CO5 L4



(OR)

10. Two weights $W_1 = 400$ N and $W_2 = 100$ N are connected by a string and move along a horizontal plane under the action of force $P = 200$ N applied horizontally to the weight W. The coefficient of friction between the weights and the plane is 0.25. Determine the acceleration of the weights and the tension in the string. 14M CO5 L4



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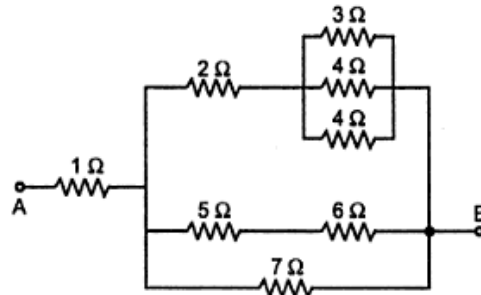
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UNIT-I

1. a) Describe Kirchhoff's laws with suitable examples.
b) Find the equivalent resistance between the terminals A and B.

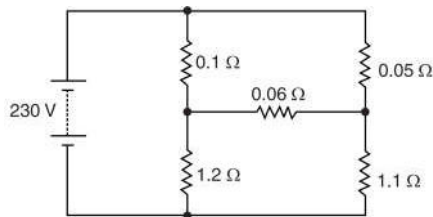
Marks	CO	Blooms Level
6	1	Remembering
8	1	Applying



(OR)

2. a) For the circuit shown in below Figure, determine the branch currents using Kirchhoff's laws.

8	1	Applying
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- b) Illustrate faraday's laws of electromagnetic induction.

6	1	understanding
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UNIT-II

3. a) Analyze the behaviour of AC through R-L series circuit with relevant waveforms and phasor diagram
b) Derive the expressions for average value and RMS value for a sine wave.

6	2	Analyzing
8	2	Applying

(OR)

4. a) Derive the expression for RMS value of alternating current wave $i = I_m \sin \omega t$.
b) In a series circuit containing pure resistance and a pure inductance, the current and the voltage are expressed as

6	2	understanding
8	2	evaluating

$$i(t) = 5 \sin(314t + 2\pi/3) \text{ and } v(t) = 15 \sin(314t + 5\pi/6)$$

- (a) What is the impedance of the circuit? (b) What is the value of the resistance? (c) What is the inductance in henrys? (d) What is the average power drawn by the circuit? (e) What is the power factor?

UNIT-III

5. a) Derive the expression for the EMF equation of a DC Generator.
b) Describe the operation of 3 point starter with neat sketch.

7	3	Analysing
7	3	understanding

(OR)

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|----|----|--|---|---|---------------|
| 6. | a) | Classify DC generators with neat diagrams. | 6 | 3 | Understanding |
| | b) | A 6-pole generator has a lap-wound armature with 40 slots with 20 conductors per slot. The flux per pole is 25mWb. Calculate the speed at which the machine must be driven to generate an e.m.f. of 300 V. | 8 | 3 | applying |

UNIT-IV

- | | | | | | |
|----|----|---|---|---|---------------|
| 7. | a) | Draw the forward and Reverse characteristics of a P-N junction diode and explain. | 7 | 4 | analyzing |
| | b) | Explain the Concept of Zener Breakdown and its V-I characteristics. | 7 | 4 | Understanding |

(OR)

- | | | | | | |
|----|----|---|---|---|---------------|
| 8. | a) | Explain the working of a Zener diode as a voltage regulator. | 7 | 4 | Understanding |
| | b) | Explain the VI characteristics of PN Junction diode with neat diagrams and explain. What is Static Resistance and Dynamic Resistance? | 7 | 4 | Analyzing |

UNIT-V

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|----|----|--|---|---|---------------|
| 9. | a) | With necessary diagrams, Describe BJT operation as a linear device and BJT operation as a switch. | 7 | 5 | Understanding |
| | b) | Explain how the pinch off voltage can be modified without changing the physical structure of a JFET. | 7 | 5 | Analyzing |

(OR)

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|-----|----|--|---|---|---------------|
| 10. | a) | Explain various characteristics of BJT in Common Base configuration with neat diagram. | 7 | 5 | Understanding |
| | b) | Explain the construction & working of depletion MOSFET and enhancement MOSFET with its necessary characteristics curve | 7 | 5 | Analyzing |

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

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		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) Explain the construction and working of a semiconductor diode.	7	1	2
	b) Explain avalanche and zener breakdown in diodes..	7	1	2
(OR)				
2.	a) Compare the working of a Zener diode and a Tunnel diode	7	1	4
	b) Explain the applications of photo diode.	7	1	2
<u>UNIT-II</u>				
3.	a) Explain the working of a full-wave rectifier with neat sketch.	8	2	4
	b) Compare the ripple factor of different types of rectifiers.	6	2	5
(OR)				
4.	a) Explain the concept of voltage regulation in rectifier circuits.	7	2	2
	b) Compare the performance of capacitor and inductor filters in rectifiers.	7	2	4
<u>UNIT-III</u>				
5.	a) Describe the input and output characteristics of a BJT in Common Base configuration.	10	3	2
	b) Explain the importance of saturation and cutoff regions in BJT operation	4	3	3
(OR)				
6.	a) Explain the working principle of a MOSFET and its classification.	7	3	2
	b) Compare the characteristics of JFET and UJT	7	3	4
<u>UNIT-IV</u>				
7.	a) Explain the fixed biasing circuit in transistors.	6	4	2
	b) Derive the stability factor for a collector-to-base bias circuit	8	4	5
(OR)				
8.	a) Explain the concept of thermal runaway and methods to prevent it.	7	4	2
	b) Discuss the significance of stability factors in transistor biasing	7	4	4
<u>UNIT-V</u>				
9.	a) Discuss the voltage gain and output resistance of a Common emitter amplifier.	10	5	4
	b) Explain the concept of current gain in different transistor amplifier configurations.	4	5	2
(OR)				
10.	a) Discuss the advantages of the hybrid model in transistor analysis.	7	5	2
	b) Explain the role of impedance matching in transistor amplifiers	7	5	3

**Programming for Problem Solving
(Common to EEE & MECH 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

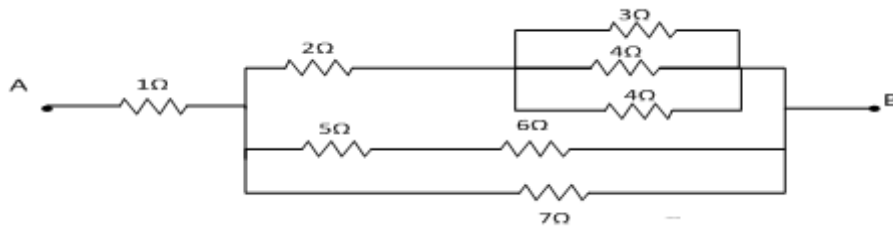
Answer ONE Question from each Unit

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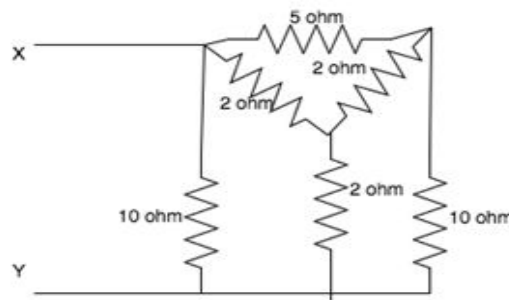
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UNIT-I

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)**

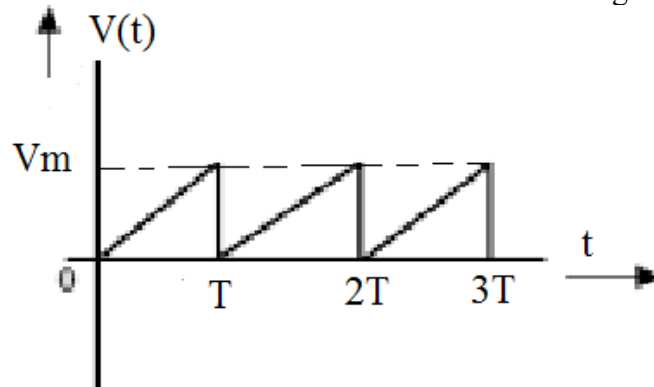
2. a) Find the equivalent resistance between the terminals X and Y by using star-delta transformation technique. 8M



- 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

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UNIT-I

1. a. State KVL and KCL with an example. 7M
- b. Derive the equations for a star connected network. 7M

(OR)

2. a. State and explain Faraday's Laws of electromagnetic induction? 7M
- b. A flux of 0.5 mWb is produced by a coil of 900 turns wound on a ring with a current of 3 A in it. Calculate (i) the inductance of the coil (ii) the e.m.f. induced in the coil when a current of 5 A is switched off, assuming the current to fall to zero in 1 millisecond and (iii) the mutual inductance between the coils, if a second coil of 600 turns is uniformly wound over the first coil? 7M

UNIT-II

3. a. Derive EMF equation of DC generator? 7M
- b. Explain the working principle of DC generator. 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. Explain the working principle of single phase transformer. 7M

(OR)

6. a. Draw and explain the torque slip characteristics of an induction motor? 7M
- b. Differentiate between the Squirrel cage and wound cage type of rotors in Induction motors. 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. Explain the working principle of P-N junction diode and draw its VI characteristics. 7M

(OR)

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