

Reg No :

Name :

**MAR ATHANASIOUS COLLEGE OF ENGINEERING, KOTHAMANGALAM**

(Govt. Aided Autonomous Institution)

Second Semester B.Tech. Degree Examination, May, 2026

Course Code: B24ES1T04

Course Name: BASIC ELECTRICAL AND MECHANICAL ENGINEERING

Max. Marks: 100

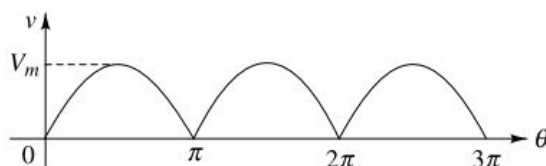
Duration:3 Hours

Instruction: Answer PART – I and PART – II in separate answer books**PART - I : Basic Electrical Engineering (50Marks)****PART - A: 20 Marks (5 Qns x 4 Marks)****Answer all questions**

1. Draw the impedance triangle of a series RC circuit and define the power factor.
2. Three resistors are connected in series across a 12V battery. The first resistor has a value of 1Ω , second has a voltage drop of 4V and third has a power dissipation of 12W. Calculate the value of the circuit current.
3. Differentiate between lap winding and wave winding.
4. Define phase sequence of a three phase system. Represent ABC and ACB phase sequences.
5. Compare functions of a circuit breaker and a fuse.

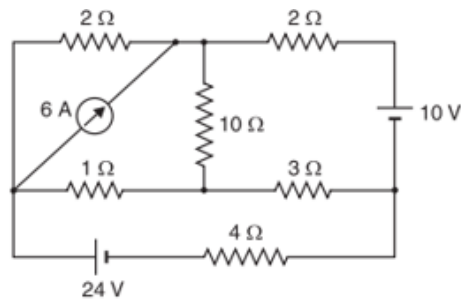
PART - B: 30 Marks (3 Qns x 10 Marks)**Answer any One full question from each module.****Module 1**

6. Derive the RMS value and average value of the full wave rectified sinusoidal waveform.



OR

7. Apply Kirchhoff's laws to determine the current in 4Ω resistance of the given circuit.



Module 2

8. a. With neat diagrams, explain the difference between self-induced emf and mutually induced emf. (4 Marks)
- b. Explain the relationship between changing magnetic flux and induced electromotive force (EMF) as described by Faraday's Law. (6 Marks)

OR

9. a. With neat sketches, explain the working principle of a DC motor. (4 Marks)
- b. A 500V, shunt motor has 8 poles with a wave wound armature having 1208 conductors. The flux per pole is 1×10^{-2} webers. If the armature and field resistance are 1.0Ω and 250Ω respectively, find the speed at which it would run, when taking a current of 40A from the mains. (6 Marks)

Module 3

10. a. A residential building has 15 light points, 8 fans, 10 number of 5A sockets and 3 number of power plugs. Determine, (6 Marks)
 - a) Total connected load
 - b) Type of electrical connection
 - c) number of sub circuits.
- b. State reasons why the load in a consumers installation is divided into subcircuits. (4 Marks)

OR

11. a. Describe the scope of National Electric Code 2011. (6 Marks)
- b. What are the objectives of Indian Electricity rules 1956? (4 Marks)

PART - II: Basic Mechanical Engineering (50Marks)

PART - A: 20 Marks (5 Qns x 4 Marks)

Answer all questions

1. Explain the terminologies : a) bore, b) stroke, c) compression ratio and d) clearance volume used in IC engines .
2. Explain water cooling in IC engines with a neat diagram.

3. Write a short note on V-Belt drive.
4. Explain any 4 disadvantages of using gear drives ?
5. Describe the function of spillways in a dam.

PART - B: 30 Marks (3 Qns x 10 Marks)

Answer any One full question from each module.

Module 4

6. Explain the working of centrifugal pump with a neat sketch.

OR

7. With the help of neat sketch, explain the working of Francis turbine.

Module 5

8. Explain the types and operating principle of concrete pumps used in modern construction work with neat figure.

OR

9. Describe the main components of a belt conveyor system and explain their roles in ensuring smooth operation.

Module 6

10. With a neat block diagram, describe the layout and working of a combined cycle power plant. Explain how waste heat recovery improves overall efficiency.

OR

11. Explain the working principle of winter air-conditioning systems with a neat sketch.
