Indian Maritime University

(A Central University, Govt of India)

Sep/Oct'25 SE

Programme Name: B Tech (ME)

Semester: I

Subject Code: UG11T5105

Subject Name: BASIC ELECTRICAL TECHNOLOGY

Date: 13.09.2025	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.
(ii) Options, if any, are specified in respective section.
(iii) Only non-programmable scientific calculators can be used for solving the problems

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. The Internal resistance of ideal current source is

a)0 b) ∞ c) Very low but finite d) None of the above

2. According to KVL, the algebraic sum of all IR drops and EMFs in any closed loop of a network is always

a) zero b)positive c)negative d) determined by battery e.m.fs

3. KVL deals with the conservation of?

a) mass b) Momentum c) Energy d) Charge

4. Relative permeability of vacuum is

a) $4\pi \times 10^{-7}$ H/m b) 1 H/m c)1 d) $1/4\pi$

5. The magnetic flux through a coil having a single turn is varying according to the relation: $\phi = (25t3 + 10t2 + 5t - 5)$ Wb. Determine the

impedance of the coil (in ohm) If the induced current through the coil is 10 A at t = 1 sec?

a)50 b)10 c)100 d)None of the above

6. The symbol j represents counterclockwise rotation of a vector through— degrees

a)180 b)90 c)360 d)270

7. In a delta-connected system, the currents $I_R = I_B = I_Y$ =?

a) I_{Ph} b) $2I_{Ph}$ c) $3I_{Ph}$ d) $4I_{Ph}$

8. The minimum number of wattmeters required for measurement of 3 phase power is

a)1 b)2 c)3 d)4

9. The kWh meter can be classified as a/an _____ instrument

a) deflecting b) digital c) recording d) indicating

10 Creeping in energy meter can avoided by _____

a) reversing the polarity of the voltage b) drilling two diametrically opposite holes c) holding the disc d) increasing the friction

Section B

Five Questions of 02 Marks each.

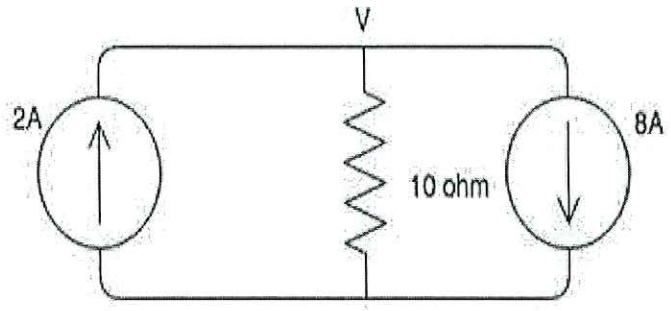
11. A current i = 5 + 14.14 sin (314 t + 45°) is passed through a center-zero PMMC and moving iron instrument. What will be the reading of both the instruments?

12. A conductor of length 1 metre moves at right angles to a uniform magnetic field of flux density 1.5 Wb/m2 with a velocity of 50 metre/second. Calculate the e.m.f. induced in it, when the conductor moves at an angle of 30° to the direction of the field.

13. How the RLC series circuit behaves for the frequencies above and below the resonant frequencies.

14. When is the force on a current-carrying conductor in a magnetic field zero?

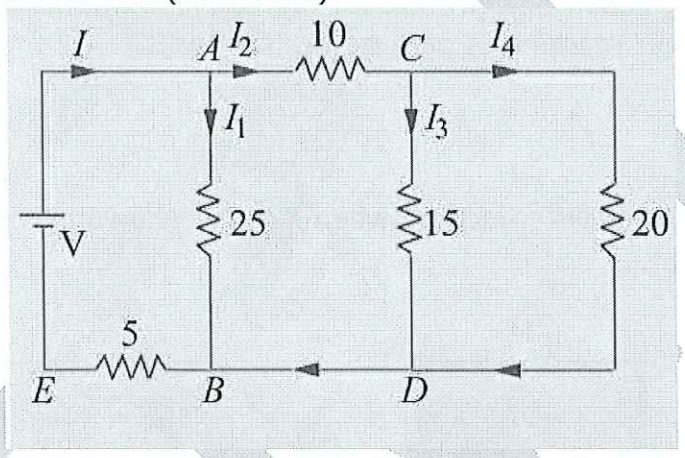
15. Find the value of the node voltage V for the circuit given below.



Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16. In the circuit of Figure below, find the value of supply voltage V so that 20-Ω resistor can dissipate 180 W (10 marks)

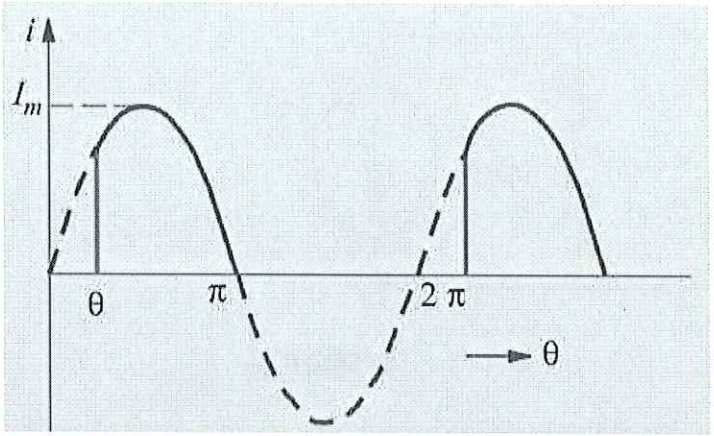


17. (a) Write short note on the following

(i) Faraday's law of Electromagnetic Induction
ii) Lenz's Law (2+2=4 marks)

(b) Derive the expression for Force on current-carrying conductor lying in the magnetic field. (6 marks)

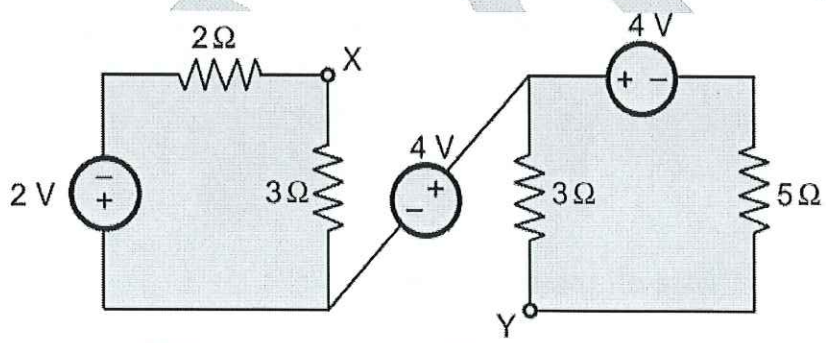
18.a) The waveform of an output current is as shown in Fig. below It consists of a portion of the positive half cycle of a sine wave between the angle θ and 180°. Determine the effective value for θ = 30°. (5 marks)



b) A three phase 400-V, 50 Hz, a.c. supply is feeding a three phase delta connected load with each phase having a resistance of 25 ohms, an inductance of 0.15 H, and a capacitor of 120 microfarads in series. Determine the line current, volt-amp, active power and reactive volt-amp and draw the load network with proper marking of parameters (5 marks)

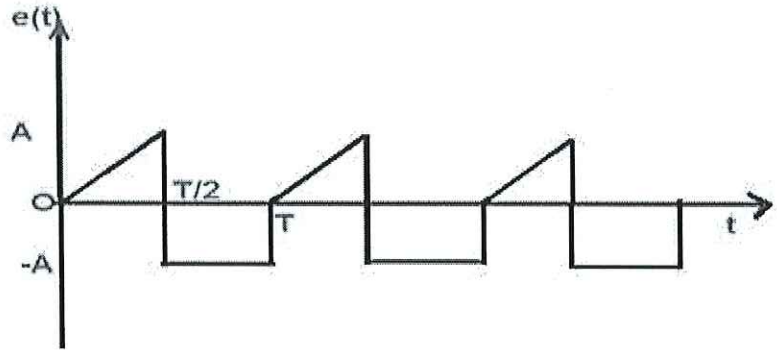
19. Find the Potential Difference between X and Y shown in the network.

(10 Marks)



20. Calculate the power dissipated in a resistance of 10Ω. The waveform profile of current flowing through the resistance is shown in the figure having a peak value A=10.

(10 marks)



21. With a neat diagram, explain the construction and working of Dynamometer type Wattmeter. (10 marks)

22. (a) Three loads, each of resistance 30, are connected in star to a 415 V, 3-phase supply. Determine

(i) the system phase voltage,
(ii) the phase current
(iii) the line current (2+1+1=4 marks)

(b) Derive the formula for power factor calculation in case of two wattmeter method. What are the major limitations of two Wattmeter method.

(5+1=6 Marks)