U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: I**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EE1ESIEE **Max Marks: 100**
Course: Introduction to Electrical Engineering **Date: 19.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) Briefly explain the conventional and non-conventional energy sources. **07**

b) With a neat schematic diagram, explain nuclear power generation. **07**

c) Two batteries A and B are connected in parallel across a load of 10 Ω. Battery A has an emf of 12 V and an internal resistance of 2 Ω. Battery B has an emf of 8 V and an internal resistance of 1 Ω. Use Kirchhoff's laws to determine the values and directions of the currents flowing in each of the batteries and the load. Also, determine the voltage across the load. **06**

UNIT - II

2 a) For a circuit shown in Fig. 2(a), find current in 1 Ω resistor using superposition theorem. **09**

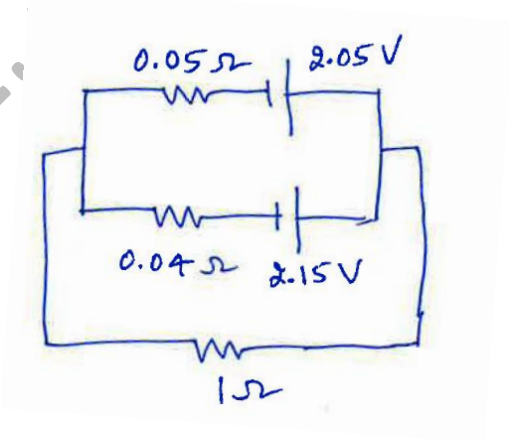

Fig.2a

b) State and explain Faradays laws of Electromagnetic induction **06**

c) An electromagnet is wound with 800 turns. Find the value of average emf induced and current through coil, if the magnetic field is changed from 1 mWb to 0.25 mWb in 0.2 sec. The resistance of the coil is 500 Ω. **05**

OR

3 a) For a given circuit shown in Fig 3(a), find voltage across R_L using Thevenin's theorem. **10**

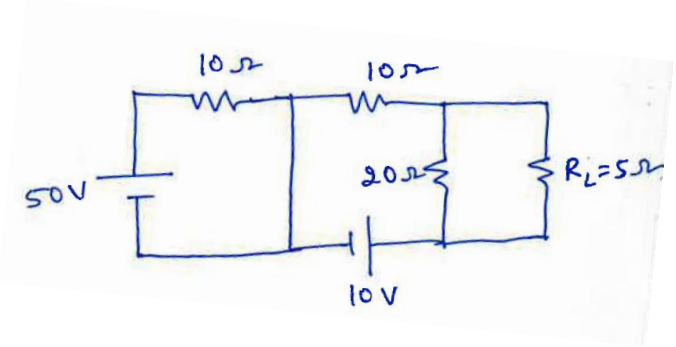

Fig. 3(a)

b) Explain statically and dynamically induced EMF with equations. **05**

c) Two coils, coil A of 12,500 turns and coil B of 16,000 turns, lie in parallel planes so that 60 % of flux produced in coil A links coil B. It is found that a current of 5 A in coil A produces a flux of 0.6 mWb while the same current in coil B produces 0.8 mWb. Determine (i) mutual inductance and (ii) coupling coefficient. **05**

UNIT - III

4 a) Show that current lags voltage in an RL series circuit. Also, draw the phasor diagram and waveforms. **06**

b) Define the following with respect to single phase AC waveforms: **08**

(i) RMS Value
(ii) Average Value
(iii) Phase angle
(iv) Time period

c) With phasor diagram and waveforms, show that current lags voltage by 90^0 for a pure inductive circuit. **06**

UNIT - IV

5 a) Derive an EMF equation of a transformer **06**

b) Explain different types of losses in a transformer and how to minimise those losses. **06**

c) A 200-kVA transformer has an efficiency of 98% at full load. If the maximum efficiency occurs at $3/4^{th}$ of its full-load, calculate the efficiency at half load. Neglect magnetizing current and assume power factor as 0.8 at all loads **08**

OR

6 a) Derive the equation for torque in a DC motor **06**

b) Draw the equivalent circuit of DC series motor and shunt motor. Obtain the voltage and current equations **06**

c) Determine the torque developed in a 220 V, 4 -Pole DC series motor with 800 conductors wave connected supplying a load of 8.2 kW by taking 45 A from the mains. The flux per pole is 25 mWb and its armature and series field resistances are 0.6 Ω and 0.1 Ω respectively. Also find the shaft torque. **08**

UNIT - V

7 a) A household has different electrical appliances which run for a certain duration in a day **08**

S.No	Appliance	Power Rating in watts	Quantity	No. of hours per day
1	Water geyser	2000	1	2
2	TV	100	1	10
3	Lamps	40	5	6
4	Fan	60	2	10
5	Laptop	150	1	10

If a 3 kW energy meter is installed in a house, Fixed cost/kW is 100 Rupees and cost for one unit is 5 Rupees. Calculate the electricity bill for September month using two-part tariff.

b) Explain working principle of fuse, list the demerits and explain how these are overcome using miniature circuit breaker. **05**

c) Explain the need for earthing the appliances and with a neat sketch explain pipe earthing. **07**

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