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MID TERM EXAMINATION – November 2024

Programme	: B.Tech.	Semester	: Interim Semester 2024-25
Course Title	: Electric Circuits and Systems	Course Code	: EEE1001
Date/Session	: 6 Nov 2024/Session II	Slot	: B21+B22+B23
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

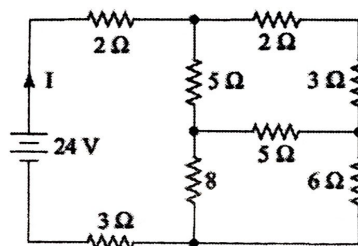| Q.No.	Sub. Sec.	Question Description	Marks
1	(a)	Calculate the the total current supplied by the battery shown in Fig.1.	4

Fig.1.

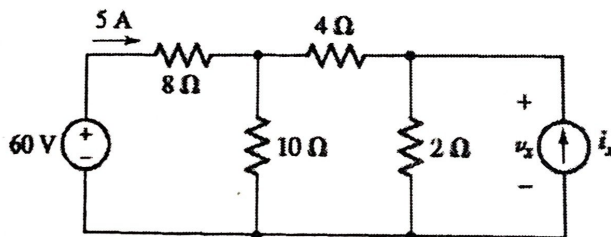| 1 | (b) | Determine v_x in the given circuit shown in Fig.2. | 6 |

Fig.2.

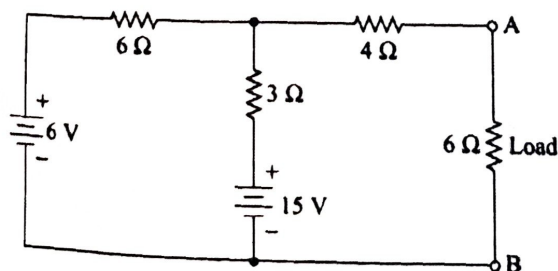| 2 | (a) | Determine the current through the load resistance connected across the terminals A and B using mesh analysis shown in Fig.3. | 4 |

Fig.3.

2 (b) State Superposition theorem.

Calculate the value of load resistance R_L for which maximum power transfer will occur from source to load. Also calculate the value of maximum power in the given circuit shown in Fig.4.
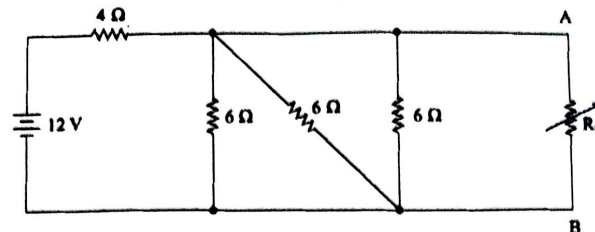
6

Fig.4.

3 (a) Show that current in a pure inductive circuit lags the voltage by 90°.

2

3 (b) What should be the value of R for which a current of 25 A will flow through it in the given circuit shown in Fig.5.
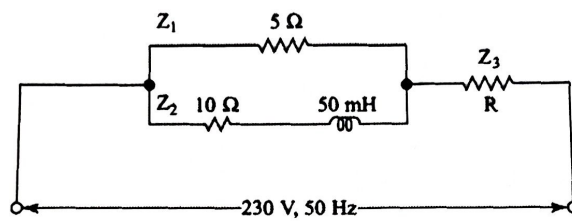

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Fig.5.

4 (a) An R–L–C series circuit has R = 10 Ω, L = 0.1 H, and C = 8 μF. Calculate the resonant frequency.

2

4 (b) Consider a linear time inverse system given by

$$\frac{d^2y(t)}{dt^2} - 9\frac{dy(t)}{dt} + 14y(t) = \frac{dx(t)}{dt} + 2x(t)$$

$$x(t) = e^{-2t}\,u(t)$$

8

Find natural response, forced response, and total response for initial condition: $y(0) = 5$, $\frac{dy(0)}{dt} = 0$.

5 (a) A circular coil of radius r metres is carrying a current of I Amperes. Determine the magnetic field strength H at a point P which is situated at a distance of d metres from the centre of the coil. Also, determine the field strength at the centre of the coil.

5

5 (b) An iron ring with permeability 2000 has a mean length of an iron path of 1 m and has a uniform cross-sectional area of 10 cm². It is wound with two magnetizing coils in a manner such that the current flowing through the two coils produce flux in opposite directions. A cut in the ring creates an air gap of 0.1 cm. Calculate the flux.

5