

DEPARTMENT OF ELECTRICAL ENGINEERING
 COLLEGE OF ENGINEERING, PUNE-05
End Semester Examination
F.Y.B.TECH
SUBJECT:- BASIC ELECTRICAL ENGINEERING

Date:-19/11/2010
 Time:-10.00 am to 1.00 pm

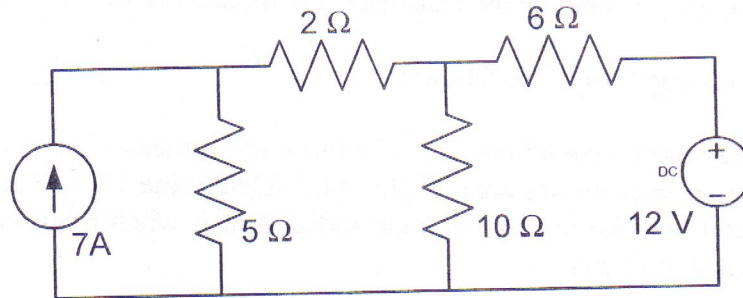
Max. Marks.:-50

Instructions:-

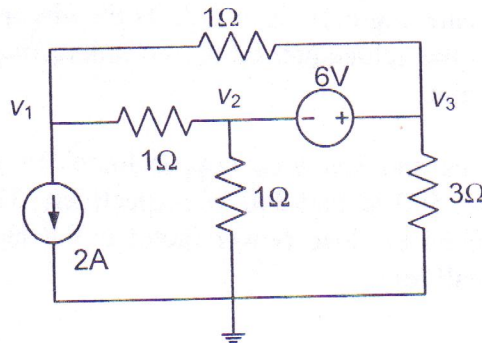
1. All questions are **compulsory** and carry **equal marks**.
2. All questions must be attempted sequentially 1 to 5.
3. Sub-questions of each question must be attempted at one place.
4. All the symbols and notations carry their usual meaning unless otherwise stated.

Q 1. Answer **any two** of the following. **10**

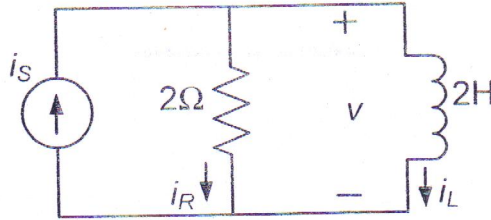
- (i) A 60 W, 240 V incandescent filament lamp is switched on at 20°C . The operating temperature of the filament is 2000°C . Determine the current taken by the lamp at the instant of switching on. The temperature coefficient of resistance at 20°C of the filament material is 0.0045/°C.
- (ii) For the circuit shown below, find the current through 2 Ω resistance by Thevenin's theorem.



- (iii) Find the node voltages for the circuit shown below.



- Q 2. (a) For the parallel RL circuit given below, find the unit step responses $i_L(t)$ and $v(t)$. Also sketch these functions. 5



- (b) A voltage of $250\angle 0^\circ$ V is applied to an inductive circuit of impedance $(5 + j10)\Omega$. Calculate 5
- Circuit current
 - Power factor
 - Power consumption
 - Apparent power
 - Reactive power

- Q 3. (a) An impedance of $20\angle 50^\circ\Omega$ is connected in series with another impedance of $15\angle -45^\circ\Omega$ and the combination takes a current of 2 A. Calculate total impedance and voltage across it. Also calculate the voltage across each impedance. 5

- (b) Three similar inductive coils connected in star are supplied by a three phase, 415 V, 50 Hz supply. The line current is 4 A at a power factor of 0.6 lagging. Calculate the resistance and inductance of the coil. 5

- Q 4. Answer **any two** of the following. 10

- An air-cored toroidal coil has 450 turns and a mean diameter of 300 mm and a cross-sectional area of 300 mm^2 . Determine the self inductance of the coil and the average voltage induced in it when a current of 2 A is reversed in 40 ms.
- A steel ring of 10 cm mean radius and circular cross section of 2 cm diameter has an airgap of 1mm wide. It is wound uniformly with 1000 turns of wire carrying current of 1 A. If the airgap takes 60% of the total mmf, what is the reluctance of the complete magnetic circuit? Neglect magnetic leakage.
- The core losses and full load copper losses in a 50 kVA, 1Φ , 50 Hz transformer are 500 W and 800 W respectively. Determine the efficiency at full load when the load power factor is 0.8 lagging. What will be its efficiency at half load?

- Q 5. (a) In a residential house, the following loads are connected: 4
- (i) Five lamps of 40 w each, switched on for 7 hours a day.
 - (ii) Three fans of 60 W each, switched on for 10 hours a day.
 - (iii) One 1kW geyser working for one hour a day.
 - (iv) One refrigerator of 250 W working for 12 hours a day.
- If each unit of energy costs Rs. 2.50, what will be the total energy cost in the month of October?
- (b) State and explain the concept of 'Voltage Regulation' of a transformer. 2
What is its value for an ideal transformer?
- (c) Answer **any one** of the following: 4
- (i) What are the different types of DC generators? Illustrate with connection diagrams.
 - (ii) Explain the principle of operation of three phase induction motor.

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