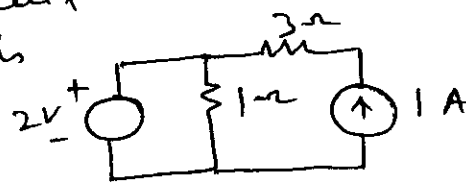


Model Question Paper

SECTION - A

- 1) The most elementary ^{form} of a loop which can't be further divided is called -----.
- 2) Which of the following theorem is applicable for both linear and non linear circuit
(a) Superposition Theorem (b) Thevenin's Theorem (c) Maxm power Transfer Theorem (d) None of the above.
- 3) Superposition Theorem is not applicable for
a) voltage calculation (b) bilateral elements (c) power calculation
- 4) When a source is delivered maxm power to load, the η will be
(a) maxm (b) minm (c) above 50% (d) 50%.

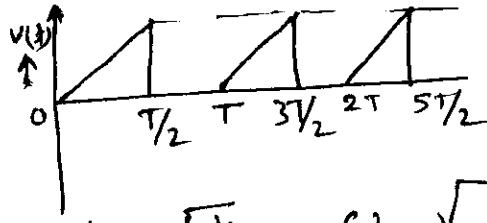
- 5) For the circuit shown in fig the power delivered by 2V source is



- (a) 4W (b) 2W (c) -2W (d) -4W

- 6) To improve power factor of a circuit, a capacitor is connected in ----- to the load.
- 7) The current in resonance parallel L-C circuit will be
(a) very small (b) very large (c) zero (d) infinity.
- 8) When a sinusoidal voltage is applied across R-L series circuit having $R = X_L$ the ^{phase} angle will be
(a) 90° (b) 45° lag (c) 45° lead (d) 90° lead
- 9) A 10 mH inductor carries a sinusoidal current of 1 A r.m.s at a frequency of 50 Hz. The average power dissipated by the inductor is
(a) 0W (b) 0.25W (c) 0.5W (d) 1.0W

10) For the triangular wave form the r.m.s value of voltage will be



- (a) $\sqrt{1/6}$ (b) $\sqrt{1/2}$ (c) $\sqrt{3/2}$ (d) $\sqrt{5}$

11) The quality factor of RLC circuit will increase if

- (a) X decreases (b) R increases (c) R decreases (d) voltage increases

12) ~~The phase sequence~~ when quality factor of circuit is high then

- (a) impedance of circuit is low (b) bandwidth is low
(c) bandwidth is high (d) power factor of the circuit is high.

13) At higher frequency, the value of capacitive reactance

- (a) increases (b) decreases (c) remains the same
(d) increases and also depends upon applied voltage.

14) In parallel resonance

- 1) Impedance $Z = \dots$
 2) $I = \dots$
 3) $f_r = \dots$
 4) $Q = \dots$
 5) $BW = \dots$

15) In series RLC circuit half power frequency is given by

- (a) $f_1 = f_r - \dots$
 (b) $f_2 = f_r + \dots$

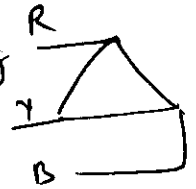
16) In star connection line to line voltage is 400V, then phase voltage will be

- (a) 228V (b) 240V (c) $400/\sqrt{3}$ (d) $\sqrt{3} \times 400$ V.

(17) To transmit the same amount of power over a particular distance at a given voltage, the amount of conducting material required in 3 ϕ system to that of 1 ϕ system will be

- (a) 2 times (b) 0.5 times (c) $\sqrt{3}$ times (d) 0.75 times.

(18) The phase sequence of 3 ϕ system shown in fig



- (a) RYB (b) RBY (c) BYR (d) YBR

19) In a two wattmeter method of measuring power in a 3 ϕ system one of the wattmeter reads \pm ve implying

(a) wattmeter connection is faulty (b) load is unbalanced
(c) power flow is in the reverse direction (d) power factor is less than 0.5.

20) The deflecting torque of moving iron instrument is proportional to

(a) I (b) I^2 (c) \sqrt{I} (d) $3\sqrt{I}$

21) An advantage of PMMC instrument is that it is

(a) free from friction error (b) has high (torque/weight) of the moving part ratio (c) has low (torque/weight) of the moving part ratio (d) can't be used for both ac and dc.

22) A dc ammeter has a resistance of 0.1Ω and its current range is $0-100 \text{ A}$. If the range is to be extended to $0-500 \text{ A}$, then meter requires the following shunt resistance.

- (a) 0.025Ω (b) 0.0025Ω (c) 0.125Ω (d) 1.025Ω

23) A spiral spring attached to the moving system is used to produce

(a) damping torque (b) controlling torque (c) deflecting torque (d) balancing torque

24) If an energy meter disc makes 10 rev in 100 sec when a load of 450 watt is connected to it the meter constant (in rev/kwh)

(a) 900 (b) 600 (c) 450 (d) 800

Q2 ATTEMPT ANY THREE PARTS OF THE FOLLOWING

- a) Find the current in 2Ω resistor of the network shown in Fig (1) using Thevenin's theorem.

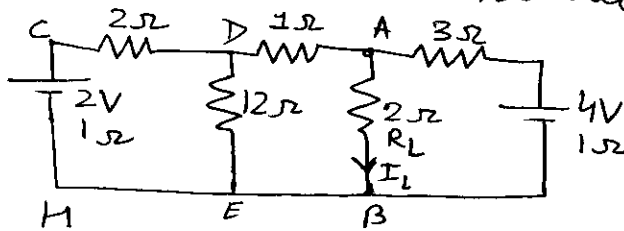


FIG (1)

- b) An iron ring of mean length 60cm has an air gap of 2mm. It is wound with 300 turns of wire. If the relative permeability of iron is 300 when a current of 0.7A flows through the coil, find the flux density.
- c) Current of 7.5A flows through a non inductive resistance in series with a choke coil when connected to supply of 230V, 50Hz. If the voltage across the resistance is 110V and across the coil is 180V, calculate i) resistance, reactance & impedance of the choke coil. ii) total resistance and impedance of the circuit iii) power absorbed by coil iv) total power drawn by the circuit v) power factor of whole circuit.
- d) Three inductive coils each having a resistance of 20Ω and reactance of 15Ω are connected in delta across a 3 phase, 400V, 50Hz supply. Calculate ~~in~~ the readings of two wattmeters connected in the circuit to measure power input. Also determine the phase and line currents.

e) The armature of a 4-pole lap wound shunt generator has 120 slots with 4 conductors per slot. Flux per pole is 0.05 Wb . The armature resistance is 0.05Ω & shunt field resistance is 50Ω . Find the speed of the machine when supplying 450 A at terminal voltage of 250 V .

Attempt any one part from each question.

- Q.3 (a) Derive expressions for converting a star network to delta. Also state Norton's theorem.
- (b) In the circuit shown in fig (i) find (i) the Norton's equivalent circuit at terminal A-B (ii) the maximum power that can be provided to a resistor R connected to terminals A-B.
- Q.4 (a) Explain 'series resonance' and 'parallel resonance'. Mention their similarities & dissimilarities.
- (b) The instantaneous values of two alternating voltages are represented by $v_1 = 60 \sin \omega t$ and $v_2 = 40 \sin(\omega t - \frac{\pi}{3})$. Derive expressions for the instantaneous values of (i) the sum and (ii) the difference of these voltages. Also draw the phasor diagram for the same.
- Q.5 (a) Describe the operating principles of measuring instruments. What are the various torques acting on the moving mechanism of the instruments? How are these obtained and what are their roles in the operation of instruments?
- (b) A fluorescent tube takes a current of 0.75 A at p.f. 0.4 (lagging) when connected across a 250 V, 50 Hz supply. Calculate the value of the capacitance to be connected in parallel with the tube to improve the p.f. to (a) unity (b) 0.92 lagging.
- Q.6 (a) Define the following terms as applied to magnetic circuits: (i) MMF (ii) Flux density (iii) Reluctance (iv) Permeability. Also differentiate between Electric & Magnetic circuits.
- (b) A 200 KVA transformer has an efficiency of 98% at full load. If the maximum efficiency occurs at three-quarters of full load, calculate the efficiency at half load. Assume negligible

magnetising current and p.f of 0.8 at all loads.

Q. 7. (a) Explain, why single-phase induction motor is not self-starting and discuss any two methods used to produce starting torque in such motors.

(b) A dc shunt motor draws 10 A at no load from 230 V mains and runs at 1500 rpm. At full load, armature current is 100 A and speed is 1,470 rpm. Armature resistance of the motor is 0.1Ω and fd. current negligible. Find (i) back emf at no-load & full load.

(ii) ratio of full-load to no-load torque

(iii) speed at which armature should be run to make it deliver 100 A at 220 V as generator. Assume the same flux as with motor operation at full load of 100 A.

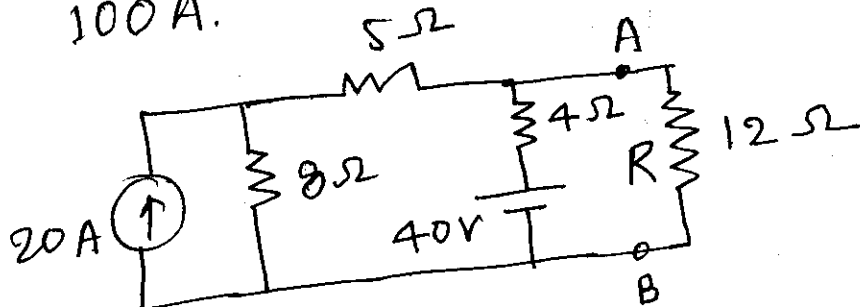


fig ①