MODEL TEST PAPER

ELECTRICAL ENGINEERING EEE-101

I SECTION A

[20X1]

① The highest transmission voltage in India is
a) 765KV b) 400kV c) 220kV d) 132kV

② Feeder is designed from the point of view of
a) its current carrying capacity
b) voltage drop in it
c) operating voltage

③ Conductance in electrical circuit is analogous to _____ in magnetic circuit
a) flux b) reluctance c) permeance d) resistance

④ Given two coupled inductances L_1 & L_2 their mutual inductance 'M' satisfy
a) $M \leq \sqrt{L_1 L_2}$ b) $M \geq \sqrt{L_1 L_2}$ c) $M = \sqrt{L_1 L_2}$ d) $M > \frac{L_1 + L_2}{2}$

⑤ Area of hysteresis loop represents
a) copper loss b) eddy current loss c) hysteresis loss d) both (b) & (c)

⑥ Transformer core is laminated to reduce
a) ~~resistance~~ copper loss b) eddy current c) hysteresis loss

⑦ No load primary ~~current~~ input is practically equal to the iron loss in transformer because primary current is very small
a) True b) False

⑧ The core flux in transformer depends mainly on
a) supply voltage b) supply voltage & frequency
c) supply frequency and load d) supply voltage and load but independent of frequency.

(9) Primary wdg of x^er comprises of two identical wdg in parallel. If one wdg is removed, magnetizing current will be
(a) Halved (b) the same (c) doubled (d) increased 4 times

(10) The condition for max^m η of x^er is then
(a) Cu loss = $\frac{1}{2}$ of Iron loss (b) cu loss are square of iron loss
(c) Cu loss = Iron loss

(11) Interpoles are used to ----.

(12) A 4 pole dc lap winding will have --- parallel path.

(13) The electromagnetic torque developed in dc m/c depends upon
a) Armature current magnetic field (c) magnetic field and armature current (d) speed.

(14) Which of the following motors has high starting torque
a) DC Shunt Motor (b) DC series Motor (c) both a and b (d) none of the above.

(15) The speed of dc shunt motor increases as the armature torque increases (a) true (b) false.

(16) An induction motor having 8 poles runs at 727.5 r.p.m. If the supply frequency is 50HZ. The emf in the rotor will have a frequency of
(a) 1.5 HZ b) 48.5 HZ (c) 5.15 HZ (d) 75 HZ

(17) The m.m.f produced by current of 3φ induction motor
(a) rotates at speed of rotor in the air gap
b) is standstill w.r.t stator m.m.f
c) rotates at slip speed w.r.t. stator m.m.f
d) rotates at synchronous speed w.r.t. rotor.

(18) At start the slip of induction motor is
a) zero (b) 0.5 (c) one (d) infinite.

(19) Single phase induction motor is self starting motor
(a) True (b) false.

(20) In a 1φ induction motor at start, the two revolving field produce:
a) unequal torques in rotor conductors (b) no torque in rotor
Conductors (c) equal and opposite torque in rotor Conductor.

(21) Synchronous motors are not self starting because

a) Starters can't be used on these m/c
b) starting wdg is not providing on these m/c.
c) the direction of rotation is not reversed
d) the direction in instantaneous torque reverse after half cycle.

(22) -) Synchronous speed for synchronous motor is given by

a) $120f/p$ (b) $\frac{120p}{f}$ (c) $120pf$ (d) $200f/p$

(23) The synchronous motors in comparison to induction motors are cheaper in high speed range.

a) True (b) false.

(24) The torque developed in a 3φ induction motor at synchronous speed is maxm

(a) True (b) false.

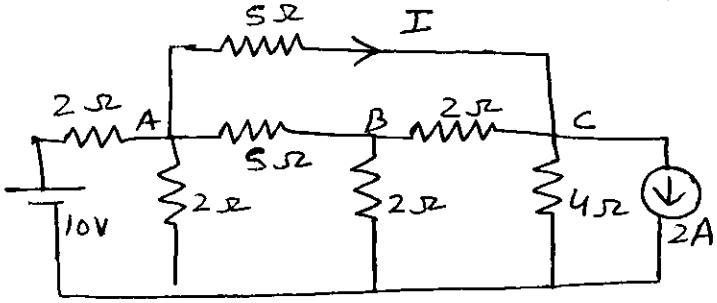
(25) An 8 pole dc generator has simplex wave wound armature containing 32 coils of 6 turns each. Its flux per pole is 0.06 Wb. The m/c is running at 250 r.p.m. The induced armature Vltge is

(a) 96V (b) 192V (c) 384V (d) 768V.

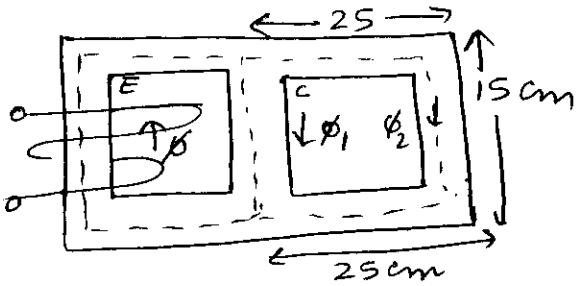
SECTION - B

Q2). Attempt any three parts of the following [10 x 3]

a) Calculate the current flowing in 5Ω branch (AC) of the circuit shown in Fig(1) using nodal analysis



FIG(1)



FIG(2)

(B) A cast steel magnetic structure made for a bar of section 8cm x 8cm is shown in Fig(2). Determine the current that the 500 turn magnetising coil on the left limb should carry so that a flux of 2mWb is produced in the right limb. $\mu_r = 600$ & neglect leakage

c) An inductive coil of resistance 10Ω & inductance 0.1H is connected in parallel with a 150μF capacitor to a variable frequency, 200V supply. Find the frequency (resonant) at which the total current taken from the supply is in phase with the supply voltage.

d) Three inductive coils, each with a resistance of 15Ω and an inductance of 0.03H are connected i) in star ii) in delta to a 3 phase, 400V, 50Hz supply. Calculate for each case above i) phase current & line current ii) total power absorbed.

e) An 8 pole alternator runs at 750 rpm. It supplies power to a 6 pole, 3 phase induction motor which has a full load slip of 3%. Find the full load speed of the induction motor and the frequency of its rotor emf.

Section C

Marks: 10 x 5 = 50

Attempt any one part from each question.

Q 3. (a) Explain Maximum power Transfer theorem & prove that R_L will abstract maximum power from the network when $R_L = R$ in fig (i) & find the value of maximum power supplied by the source.

(b) Use Thevenin's theorem to find the current flowing through the 6Ω resistor of the network shown in fig (ii)

Q. 4 (a) Define bandwidth and half power points of a series resonant circuit. Show that $f_1 f_2 = f_r^2$ where f_r is the resonant freq. and f_1 & f_2 are the half power frequencies of a series resonant circuit.

(b) A tungsten filament lamp rated at 500W, 100V is to be connected in series with a capacitance across 220V, 50 Hz supply. Calculate (i) the value of capacitor such that the voltage & power consumed by the lamp are according to the rating of the lamp. (ii) the p.f. of the current drawn from the supply (iii) draw the phasor diagram of the circuit.

Q 5 (a) Describe the construction of a single phase induction type energy meter. Show that the number of revolution made by disc is proportional to energy supplied

(b) Three coils are connected in delta to a 3-phase, three-wire, 415V, 50 Hz supply and take a line current of a 5A at a p.f. of 0.8 lagging. Calculate the resistance & inductance of the coils. If the coils are star connected to the same supply calculate the line current and total Power.

Q 6. (a) How power ~~the~~ is being generated, transmitted & distributed to end users? Explain.

P.T.O.

Also explain the concept of Grid & load dispatch.

(b) The following results were obtained on a 50 KVA, 2,400/120 V single-phase transformer:

OC test on lv side	396 W	9.65 A	120 V
SC test on hv side	810 W	20.8 A	92 V

Calculate (i) the equivalent circuit parameters. (ii) efficiency at full-load, 0.8 power factor lagging.

Q7. (a) Explain the principle of operation of a 3-phase synchronous motor. Why is starting torque not produced in this motor. Give applications of 3-phase synchronous motor.

(b) A 3-phase delta connected 440V, 50 Hz, 4-pole induction motor has a rotor stand-still emf per phase of 130 V. If the motor is running at 1440 rpm, calculate for this speed: (i) the slip (ii) the frequency of rotor induced emf, (iii) the value of rotor induced emf per phase, and (iv) stator to rotor turn ratio.

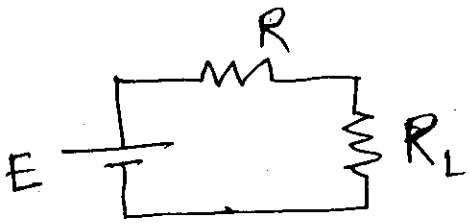


fig (i)

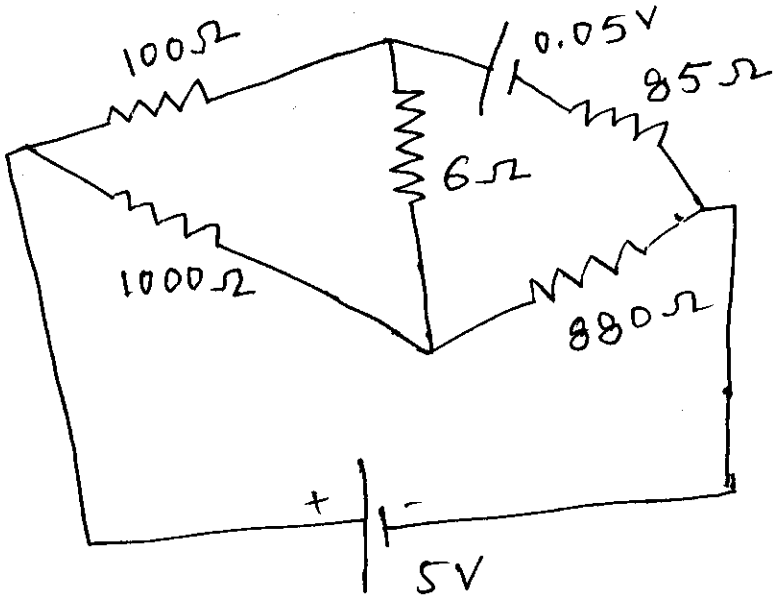


fig (ii)