4TH SEM ./ ELECT & ETC/ ELECT. & MECH./ EE(I & C) /ETC & COMM/ ETC & TELE. COMM./AE & IE/ 2022(S)

Th1 Electrical Machine

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Write different types of losses in a single phase transformer?

b. What is the relationship between synchronous speed, actual speed and slip of the induction motor?

c. IF A=8+3J and B= 9+2J.Then what is A*B=?

d. An AC series circuit consist of a resistance of 5 ohm and a capacitance of 10 farad and applied across a 230v,50Hz supply. What is the impedance and current flowing in a circuit?

e. Why short circuit test is done in single phase transformer?

f. Write condition of parallel operation of transformer and what is its necessity?

g. Classify different types of dc generator with connection diagram.

h. Write two properties of conducting material.

i. State Q factor of AC series circuit.

j. What is transformation ratio?

2. Answer **Any Six** Questions 6 x 5

a. A shunt generator deliver 450amp at 230 volt .The resistance of the shunt field and armature are 50 ohm and 0.03 ohm respectively. Calculate the generated emf.

b. With circuit diagram explain the open circuit test of a single phase transformer.

c. Establish the relationship between torque, rotor current and power factor of induction motor.

d. With diagram explain the armature control method of speed control of dc motor.

e. A no load test of a single phase transformer the following test data were obtained.

Primary voltage =220volt,
Secondary voltage=110volt,
Primary current=0.5 ampere,
Power input=30watt. Find

(i) Turns ratio.
(ii)Magnetising component of a no load current.
(iii)Iron loss component of no load current.
(iv)iron loss if the resistance of primary winding= 0.6ohm

f. Explain the starting of an induction motor by star delta starter.

g A 220 volts shunt motor running at 1000 rpm has an armature resistance of 0.3 ohm and armature current of 15A at certain load. What resistance should be placed in series with the armature to reduce the speed of the motor to 700 rpm?

3 In a 25 KVA transformer the iron and full load copper losses are 350W and 400W respectively. Calculate the efficiency at: 10

a) Full load unity power factor
b) Half full load,0.8 power factor lagging

Also determine the load for maximum efficiency.

4 A 20KVA,200/400 volt,50Hz single phase transformer give the following test result 10

OC TEST= 200V,1.3A.120Watt on Low voltage side
SC TEST =22V,30A,200watt on High voltage side.

Calculate (a) magnetising current and component corresponding to core loss at normal frequency and voltage (b) magnetizing branch impedance.

5 Explain the principle of development of rotating field in stator. 10

6 Explain with neat diagram, the operation of a four-point starter. 10

7 A 230 V, 50 Hz ac supply is applied to a coil of 0.06 H inductance and 2.5 Ω resistance connected in series with a 6.8 μF capacitor. Calculate (i) Impedance (ii) Current (iii) Phase angle between current and voltage (iv) power factor (v) Active Power, Reactive Power, Apparent Power 10