Total No. of Questions : 8]

SEAT No. :

PB-3804

[Total No. of Pages : 3

[6262]-64
T.E. (Electrical Engineering)
ELECTRICAL MACHINES - II
(2019 Pattern) (Semester - I) (303143)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2; Q3 or Q4; Q5 or Q6; Q7or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Draw the equivalent circuit diagram of 3 phase synchronous motor & state, why it is called doubly fed motor? **[4]**

b) What is significance of load angle δ? With neat sketch, explain it for NO losses & with losses. **[6]**

c) A 2300 V three phase star connected synchronous motor has armature resistance of 0.2 ohm/ph. and synchronous reactance of 2.0 ohm/ph. The motor is operated at 0.5 leading power factor and takes a current of 180 A from supply. Calculate back EMF generated in the motor & load angle δ. **[8]**

OR

Q2) a) Sketch V and inverted V curves of synchronous motor and show the power factor regions. **[4]**

b) What is hunting in synchronous motor? How to minimise it? Explain. **[6]**

c) A 3-Ph, 415 V, 50 Hz, star connected synchronous motor has Ra = 0 & Xs= 0.8 Ω / ph. If the input power remains constant at 30 kW, Calculate: generated emf / ph and torque angle at (i) unity pf (ii) 0.8 lagging pf. **[8]**

P.T.O.

Q3) a) State the methods of speed control of 3 phase Induction motor on stator & rotor side. **[3]**

b) Draw the block diagram & explain the V/f method of speed control of 3 phase induction motor. **[6]**

c) Draw the neat construction diagram and explain the working of variable reluctance stepper motor. Show the truth table. How to reverse the direction of rotation. **[8]**

OR

Q4) a) Calculate step angle & resolution of 3-ph stepper motor with 08 stator poles & 06 rotor poles. **[3]**

b) What is the Energy Efficient three phase Induction Motor? How to achieve it? **[6]**

c) With the neat schematic diagram describe the construction and working of PM D.C. motor. State its applications. **[8]**

Q5) a) Draw the torque –armature current characteristics of AC and DC series motor & comment on armature current & torque. **[4]**

b) Compare the performance of universal motor on AC & DC supply. **[6]**

c) A series motor having resistance 40Ω & inductance 0.3 H when connected to 240 V DC supply draws a current of 1 A and runs at 2000 rpm. If it is supplied by 240 V ,50 Hz AC supply with current of 1.5 A; Calculate
i) speed ii) power factor **[8]**

OR

Q6) a) What are the modifications necessary in construction of dc series motor to operate it on ac supply? **[4]**

b) Draw the approximate phasor diagram of AC series motor & explain. **[6]**

c) Compare conductively compensated and inductively compensated series motor. **[8]**

Q7) a) State the types of 1-ph induction motors. Write applications of capacitor start lM. **[3]**

b) Draw the equivalent circuit of 1 –ph induction motor for no load and blocked rotor test . Write the necessary formulae used. **[6]**

c) Sketch the torque-slip characteristics of 1–ph Induction motor based on double field revolving theory. Prove , how the 1–ph induction motor is not self-starting by mathematically & graphically. **[8]**

OR

Q8) a) What are the necessary conditions to make 1–ph induction motor self-starting? **[3]**

b) Compare single phase motor with 3 phase induction motor. **[6]**

c) 500W, 240 V, 50 Hz, single phase capacitor start induction motor has following constants Main winding: Z_m=4. 5 +j 3.7 Ω & Auxiliary winding; Za= 9.5 +j3.5 Ω , Determine value of C which will develop maximum starting torque. **[8]**