Unit - V

5. a) Draw the connection diagram of a capacitor-start induction motor showing starting and main winding.

   b) Describe the construction and working of a shaded-pole motor.

   c) Draw and explain the equivalent circuit of a single-phase induction motor. How can the performance of the motor be analysed?

   d) Draw and explain the phasor diagram of an ac series motor.

OR

A universal series motor has a resistance of 30Ω and an inductance of 0.5H. When connected to a 250 V dc supply and loaded to take 0.8A it runs at 2000 rpm. Determine the speed, torque and power factor, when connected to a 250V, 50Hz ac supply and loaded to take the same current.

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EE-404

B.E. IV Semester

Examination, December 2015

Electrical Machine - I

Time : Three Hours

Maximum Marks: 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What is a all day efficiency?

   b) Explain the basic principle of Auto-transformer.

   c) Derive the condition for maximum efficiency for a single-phase transformer.   rgpvonline.com

   d) A 230/110V single-phase transformer takes an input of 350 VA at no load and at rated voltage. The core loss is 110W. Find

   i) The iron-loss component of no-load current

   ii) The magnetizing component of no-load current and

   iii) No-load power factor

OR

A 10 kVA, single-phase transformer for 2000/400V at no-load has $R_1 = 5.5\Omega$, $X_1 = 12\Omega$, $R_2 = 0.2\Omega$, $X_2 = 0.45\Omega$. Determine the approximate value of the secondary voltage at full load, 0.8 power factor (lagging), when the primary applied voltage is 2000V. rgpvonline.com

Unit - II

2. a) What is the working principle of three phase transformer?

   b) Write the necessary condition for two transformer operated in parallel.

   c) Write the conditions for parallel operation of single phase transformers.

   d) Two single-phase transformer share a load of 400 kVA at power factor 0.8 lagging. Their equivalent impedance referred to secondary windings are $(1 + j2.5)\Omega$ and $(1.5 + j3)\Omega$ respectively. Calculate the load shared by each transformer.

OR

State the necessary conditions for satisfactory operation of two transformers in parallel. State briefly why all transformers cannot be operated in parallel.

Unit - III

3. a) Define slip. Why cannot an induction motor run at synchronous speed?

   b) Explain the principle of operation of a 3-phase induction motor.

   c) What is difference between slip ring and squirrel cage motor? rgpvonline.com

   d) It is desired to install a 3-phase cage induction motor restricting the maximum line current drawn from a 400V 3-phase supply to 120A. If the starting current is 6 times full load current, what is the maximum permissible full load kVA of the motor when rgpvonline.com

   i) It is directly connected to the mains.

   ii) It is connected through an auto-transformer with a tapping of 60%.

   iii) It is designed for use with star-delta starter.

OR

A cage induction motor when started by means of a star-delta starter takes 180% of full-load line current and develops 35% of full-load torque at starting. Calculate the starting torque and current in terms of full-load values, if an auto-transformer with 75% tapping were employed.

Unit - IV

4. a) Explain the phenomenon of crawling in a 3-phase induction.

   b) Describe the construction of double-cage induction motor explain its working.

   c) Explain the stator. rgpvonline.com

   d) Discuss briefly the various method of speed control of 3-phase induction motors.

OR

The resistance and reactance (equivalent) values of a double-cage induction motor for stator, outer and inner cage are 0.25, 1.0 and 0.15 ohm resistance and 3.5 zero and 3.0 ohms reactance respectively. Find the starting torque if the phase voltage is 250V and the synchronous speed is 1000 rpm.