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Total Number of Pages : 02

B.Tech
PEI3I103

3rd Semester Back Examination 2019-20

ENERGY CONVERSION DEVICES

BRANCH : AEIE, EIE, IEE

Max Marks : 100

Time : 3 Hours

Q.CODE : HB892

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- What do you mean by leakage flux and leakage inductance?
- Mention the methods of excitations in DC machine.
- What is residual magnetism?
- Mention the process of secondary voltage induction in case of auto transfer.
- Why dc series motor should not be started without load?
- Mention the role of commutator in dc machine.
- What is the function of transformer oil in a transformer?
- How does a dc motor adjust itself to match the mechanical load?
- Explain why three phase induction motor can not run at synchronous speed
- Why DC machine armature and pole body are laminated?

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- From the first principle derive the EMF equation of DC generator.
- Mention some specific applications of synchronous motor with justification.
- Draw and explain the no load phasor diagram of a single phase transformer
- A shunt machine, connected to a 200V mains has an armature resistance of 0.15Ω and field resistance is 100Ω . Find the ratio of its speed as a generator to its speed as a motor, line current in each case being 75 A.
- The emf per turn of a single phase, 6.6kV/440V, 50 Hz transformer is approximately 12V. Calculate the number of turns in the HV and LV windings and the net cross sectional area of the core for a maximum flux density of 1.5T.
- Determine developed torque and shaft torque of 220V, 4 pole series motor with 800 conductors wave-connected supplying a load of 8.2 kW by taking 45A from the mains. The flux per pole is 25m/Wb and its armature circuit resistance is 0.6Ω
- What is the starting torque of a synchronous motor? Explain how to start a synchronous motor?
- Explain the starting of single-phase induction motor using two reaction theory.
- Obtain the equivalent circuit of a 200/400V, 50Hz, single phase transformer from the following test data:
OC test: 200V, 0.7A, 70W on LV side
SC test: 15V, 10A, 85W on HV side
- Mention different types of poly phase induction motor available. Explain the basis of classification.
- Explain different types of speed control techniques for DC shunt motor.
- Write short note on stepper motor.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** A 4-pole, lap connected DC machine has 540 armature conductors. If the flux per pole is 0.03 Wb and runs at 1500 RPM, determine the emf generated. If this machine is driven as a shunt generator with same field flux and speed, calculate the line current if the terminal voltage is 400V. Given the $R_{SH}=450\Omega$ and $R_A=2\Omega$ **(16)**
- Q4** Draw the circuit diagrams for conducting OC and SC tests on a single phase transformer. Also explain how the efficiency and voltage regulation can be estimated by these tests. **(16)**
- Q5** Explain the speed vs. Torque and Speed vs. Armature Current characteristics of a Dc shunt and series Motor. **(16)**
- Q6** A 4 pole DC generator with wave connected in its armature has 51 slots each containing 20 conductors. What should be the flux per pole required to induce 375 Volts if the speed is 1000rpm. Compute the same for a speed of 1500rpm. **(16)**