

J C Bose University of Science & Technology YMCA, Faridabad

Examination Dec. 2018

B.Tech.(Electrical Engg.), IIIrd SEMESTER

Electrical Machines-I (EE-207C)

Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) What is a DC generator? (1.5)
(b) What are the losses in a DC machine? (1.5)
(c) What are the uses of DC shunt motor? (1.5)
(d) What will be the speed of a DC series motor at no load? (1.5)
(e) Why are iron cores in transformers made laminated? (1.5)
(f) What is turn ratio of a transformer? (1.5)
(g) What do you mean by step up and step down transformer? (1.5)
(h) State the different forms of connections used in 3-phase transformers. (1.5)
(i) What are the applications of auto-transformers? (1.5)
(j) What is armature reaction? (1.5)

PART -B

- Q2 (a) What are the methods by which the speed of a DC shunt motor can be controlled? (9)
State the advantages and disadvantages of each method.
(b) What is the necessity of a starter for a DC motor? With a neat diagram, explain the working of a three-point starter (6)
- Q3 (a) What are the important types of excitation of DC generators? Show how the terminal voltage varies with load current in each type. Explain your answer. (8)
(b) A DC series motor rotates at 1000 rpm and draws 50A at 250V. Its armature and field resistances are 0.22Ω and 0.12Ω respectively. The iron and friction losses are 0.54kW. Find the developed torque and output power of the motor. (7)
- Q4 (a) Draw the phasor diagram of a single-phase transformer supplying a lagging power factor load. (7)
(b) A 100KVA, 6600/330V single-phase transformer has the effective impedance of $4+j9\Omega$ referred to h.v.side. Calculate voltage regulation at full-load 0.8 lagging power factor. (8)
- Q5 (a) Develop the exact equivalent circuit of a single-phase transformer. (8)
(b) A transformer has the no-load loss of 55W when the primary voltage is 250V of frequency 50 Hz and the no load loss of 41W when the primary voltage is 220V of frequency 40 Hz. Determine the hysteresis and eddy current loss at the above conditions. (7)

P.T.O

Q6 (a) Explain with the help of connection and phasor diagrams, how Scott connections (10)
are used to obtain two-phase supply from three-phase supply mains.

(b) Define an auto-transformer. Distinguish clearly the difference between a resistive (5)
potential divider and auto transformer.

Q7 Discuss any three of the following: (15)

- (i) On-Load Tap changer
- (ii) Induction Regulators
- (iii) Constructional features of a DC machine.
- (iv) Three-Phase transformer connections
