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Total Number of Pages :2

B.TECH. DEGREE EXAMINATION-Nov-Dec.2018

End Semester Examination-III Semester

**BEEPC3010/BELPC3010-Electrical Machines-I**

**(Regulations 2017)(Common to EE & EEE Branches)**

Time : 3 Hours

Maximum : 100 Marks

Question Code:311712

Answer ALL Questions

**PART-A (10 X 2=20 Marks)**

- 1.(a) Where is field winding mounted in a d.c. machine? [CO1][PO1]  
a) Stator b) Rotor c) Absent d) Anywhere on stator or rotor
- (b) The armature of d.c. motor is laminated to..... [CO1][PO1]  
a) To reduce mass b) To reduce hysteresis loss c) To reduce eddy current loss  
d) To reduce inductance
- (c) Which of the following machine will be preferred to charge the batteries? [CO2][PO1]  
a) Series generator b) Series motor c) Shunt generator d) Compound generator
- (d) In a d.c. generator, the effect of armature reaction on main pole flux is to [CO2][PO1]  
a) reduce it b) distort it c) reverse it d) both a b
- (e) In a 6 pole d.c. machine, 90 mechanical degree corresponds to.....electrical degree [CO2][PO2]  
a) 30 b) 180 c) 45 d) 270
- (f) The.....generator has poorest voltage regulation [CO3][PO1]  
a) series b) shunt c) compound d) both b c
- (g) The main purpose of using core in a transformer is to [CO3][PO1]  
a) decrease iron losses b) decrease eddy current loss c) decrease copper loss  
d) decrease reluctance of magnetic circuit
- (h) The ordinary efficiency of a given transformer is maximum when [CO3][PO1]  
a) it runs at half full-load b) it runs at full-load c) its Cu loss equals iron loss  
d) its Cu losses are minimum
- (i) The main purpose of performing short-circuit test on a transformer is to measure [CO4][PO1]  
a) its Cu loss b) its iron loss c) total loss d) its efficiency
- (j) As compared to  $\Delta$ - $\Delta$  bank, the capacity of V-V bank of transformers is..... [CO4][PO2]  
a) 57.7 b) 66.7 c) 50 d) 86.6

**PART-B (10 X 2=20 Marks)**

2. a. Why is a commutator employed in a d.c. machine? [CO1][PO1]
- b. Mention any two reasons for which a d.c. shunt generator may fail to build up voltage across its terminals. [CO1][PO1]
- c. What is commutation? [CO2][PO1]
- d. What are the conditions to be satisfied for parallel operation of two d.c. shunt generators? [CO2][PO1]
- e. What is back e.m.f. in d.c.motors? [CO2][PO2]
- f. Draw the speed-armature current and torque-armature current characteristic of a d.c. shunt motor. [CO3][PO1]
- g. Why does the open circuit test on transformer give the iron losses only and not copper losses? [CO3][PO2]
- h. Draw the no-load phasor diagram of a 1-ph ideal transformer. [CO3][PO1]
- i. List the various losses that occur in a transformer. [CO4][PO1]
- j. What are the advantages of the per unit representation in a transformer? [CO4][PO1]



PART-C (4 X 15=60 Marks)

- 3.a i. Explain in detail the constructional features of a d.c. generator. Explain the function of each parts. [8][CO1][PO1]  
ii. An 8-pole d.c. generator has 500 armature conductors and a useful flux per pole of 0.05 Wb. What will be the e.m.f. generated if it is lap connected and runs at 1200 revolution per minute? What must be the speed at which it is to be driven to produce the same e.m.f. if it is wave connected? [7][CO1][PO2]  
(or)
- b. i. Explain armature reaction in d.c. machine with suitable diagram. [8][CO1][PO1]  
ii. Explain the methods of improving commutation. [7][CO1][PO1]
- 4.a. i. Explain with suitable diagrams, the speed control of a d.c. shunt motor by (i) field/flux control and (ii) armature control. [8][CO2][PO1]  
ii. A d.c. shunt generator runs at 1200 r.p.m when delivering 50 KW at 250 V. what will be the speed of the machine when runs as a motor fed through a 250 V supply and drawing 50 KW. The armature and field resistances are 0.1 and 100  $\Omega$  respectively. [7][CO2][PO2]  
(or)
- b. i. Explain the Swinburne's Test on d.c. machine. [7][CO2][PO1]  
ii. In a brake test on a d.c. shunt motor, the load on one side of the brake is 35 kg and the other side 5 kg. The motor is running at 1300 r.p.m., with a input current of 70 A at 420 V. The diameter of the pulley is 1 meter. Determine the efficiency of the motor. [8][CO2][PO2]
- 5.a. i. Explain the open circuit and short circuit test on transformer with suitable diagrams. [7][CO3][PO1]  
ii. A transformer has a resistive drop of 6 % and a reactive drop of 2.5 %. Determine maximum voltage regulation and the lagging power factor at which the voltage regulation is maximum. [8][CO3][PO2]  
(or)
- b. i. Derive an expression for saving of copper when an autotransformer is used in place of a two winding transformer. [7][CO3][PO1]  
ii. Two 1-phase transformers A and B rated at 250 kVA each are operated in parallel. Percentage impedances for A and B are  $(1+j6)$  and  $(1.2+j4.8)$  respectively. Compute the load shared by each when the total load is 500 kVA at 0.8 p.f. lagging. [8][CO3][PO2]
- 6.a. i. Draw and explain Phasor Diagrams of various Vector Groups for three phase transformers. [8][CO4][PO1]  
ii. A 11,000/6,600 V, 3-ph, transformer has a star connected primary and delta connected secondary. It supplies a 6.6 kV motor having a star connected stator, developing 969.8 kW at a pf of 0.9 lag and efficiency of 92%. Calculate the motor line and phase currents and transformer primary current. [7][CO4][PO2]  
(or)
- b. i. Two transformers connected in open delta supply with a 400 kVA balanced load operating at 0.866 pf lag. The load voltage is 400 Voltage. Calculate what is the kVA and kW supplied by each transformer? [7][CO4][PO2]  
ii. Explain with suitable diagram the Scott connection of two three phase transformers. [8][CO4][PO1]