

**B.Tech. VIEP - ELECTRICAL
ENGINEERING - III (BTCLVI)**

Term-End Examination

December, 2012

BIEE-004 : ELECTRICAL MACHINE - I

Time : 3 hours

Maximum Marks : 70

*Note : Attempt **any seven** questions. All question carry **equal** marks. Use of non-programmable scientific calculator is Permitted.*

1. (a) What do you understand by demagnetizing and cross magnetizing effects of armature reaction in d.c. machine ? **2x5=10**
(b) Explain the methods of improving commutation with relevant figures.
2. A long-shunt compound generator delivers a load current of 50A at 500V, and the resistance of armature, series field, and shunt field are 0.05Ω , 0.03Ω and 250Ω respectively. Calculate the generated emf. and the armature current. Allow 1.0 V per brush for contact drop. **10**
3. Draw a neat sketch of a d.c. machine. State the function of each part. Drive the emf. equation of a d.c. generator. **10**

4. (a) Why a d.c. series motor should not be started at no load. 2x5=10
- (b) Draw the characteristics of a d.c. series motor.
5. A 4 pole, 250V, wave connected d.c. shunt motor gives 10kW when running at 1000 r.p.m. and drawing armature and field current of 60A and 1A respectively. It has 560 conductors. Its armature resistance is 0.2Ω . Assuming a drop of 1V per brush, determine : 10
- (a) Total torque
- (b) Useful torque
- (c) Useful flux per pole
- (d) Rotational losses
- (e) Efficiency
6. A 100kVA, 50Hz, 440/11000V, single-phase transformer has an efficiency of 98.5%. When supplying full-load current at 0.8 power factor lagging, and an efficiency of 99% when supplying half full-load current at unity power factor. Find the core losses and the copper losses corresponding to full load current. At what value of load current will the maximum efficiency be attained ? 10

7. (a) Draw and explain the no - load and full load phasor diagram for a single phase transformer. 2x5=10
- (b) Explain why the hysteresis and eddy current losses occur in the transformer. How does change in frequency affect the operation of given transformer ?
8. Draw and explain the circuit diagram of a transformer arrangement for converting from a 3-phase to a 2-phase supply. 10
9. Two single-phase Scott-connected transformers supply a 3-phase, 4wire, 50Hz distribution system with 250V between line and neutral. The high voltage windings are connected to a 2-phase system with a phase voltage of 11000 V. Allow a maximum flux density of 1.2 Wb/m^2 in a gross core section of 550 cm^2 , determine the number of turns in each section of the high voltage and low voltage windings, and the position of the neutral point. 10
10. Write short notes **any two** of the following : 2x5=10
- (a) Autotransformer
- (b) Hopkinson's Test
- (c) Four - point starter
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