B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

June, 2017

00184

BIEE-004 : ELECTRICAL MACHINES – I

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. (a) Explain the working principle and constructional features of a single-phase transformer.   8

    (b) Explain the following :   6

       (i) Iron loss

       (ii) Copper loss

       (iii) Dielectric loss

2. (a) Explain the functions of commutator and brush gear system in a DC machine.   7

    (b) Derive an expression for the

       (i) Torque of a DC machine

       (ii) Rotational losses in a DC machine.   7

3. (a) Draw and explain the phasor diagram for a single-phase full load transformer. 7

(b) Derive an expression for the emf equation of a transformer. 7

4. (a) What are the different methods used for speed control of a DC motor ? Explain. 7

(b) Explain the need of starters in DC machines. 7

5. (a) Explain and draw the equivalent circuit for a single-phase transformer. 7

(b) A DC generator has an armature emf of 100 V, when the useful flux per pole is 20 mWb and the speed is 800 rpm. Calculate the generated emf with the same flux and a speed of 1000 rpm. 7

6. (a) Explain the equivalent circuit for the armature of a DC machine. 7

(b) Explain for a DC shunt motor : 7

(i) Speed-torque characteristic

(ii) Torque-armature current characteristic

(iii) Speed-armature current characteristic

7. (a) Derive an expression for the voltage regulation at lagging power factor for a single-phase transformer. 7

(b) The maximum efficiency of a 100 kVA single-phase transformer is 98% and occurs at 80% of full load at 0·8 power factor lagging. If the leakage impedance of the transformer is 5%, find the voltage regulation at full laod. 7

8. Write short notes on any *two* of the following : 2×7=14

(a) Magnetic Inrush Current Phenomenon

(b) Power Transformer

(c) Auto-Transformer

(d) Interpoles