No. of Printed Pages : 3

BIEE-016

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

Term-End Examination

December, 2016

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BIEE-016 : ELECTRO-MECHANICAL ENERGY CONVERSION – III

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. Use of scientific calculator is allowed. Each question carries equal marks.*

1. Deduce Park's transformation relating the 3-phase currents of a synchronous machine to its corresponding d-q axis currents. Express 3-phase currents in terms of d-q axis currents and its inverse. *10*

2. Explain how a rotating commutator winding can be represented by a pseudo stationary coil on the moving element. Enumerate the properties possessed by this coil. *10*

3. In an interconnection of two dc series machines, one dc series motor of total resistance of 0·5 Ω runs at a speed of 800 rpm when taking 60 A from 500 V dc mains. Another identical series motor is mechanically coupled, but connected in series with the first motor. If the set runs at 400 rpm with load torque equal to 2·5 times the original torque, find the current drawn from the dc mains. *10*

4. Obtain the transfer function of a separately excited dc generator for its (i) no load, and (ii) on-load operation. *10*

5. During the balanced 3-phase short circuit analysis of synchronous machine, explain why the induced field current and increased armature current decay with the same time constant. Also explain the involvement of d-axis parameter. *10*

6. Derive the expression for terminal voltage of a synchronous generator in case of sudden reactive loading and unloading. *10*

7. Draw the generalized mathematical model of a 3-phase induction machine. Write down the voltage equations in matrix form and obtain the equivalent circuit. *10*

8. (a) Enumerate the merits and demerits of an ac servomotor. *5*

(b) How can the direction of rotation of a two-phase servomotor be reversed ? *5*

9. Write short notes on any ***two*** of the following : *2×5=10*

(a) Single Phase Series Motor

(b) Stepper Motor

(c) Operation of Induction Motor on Unbalanced Supply Voltage