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BIEE-004

B.Tech. - VIEP - ELECTRICAL ENGINEERING

(BTELVI)

Term-End Examination, 2019

BIEE-004 : ELECTRICAL MACHINES - I

Time : 3 Hours]

[Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Use of Scientific Calculator is allowed.

1. (a) Discuss the advantage and disadvantage of an auto-transformer as compared to a two Winding transformer. [7]
- (b) A 1-phase, 250/500V transformer gave the following results : [7]
- (i) Open Circuit set test 250 V, 1A, 80W on low voltage side.
- (ii) Short Circuit test 20V, 12A, 100W on high voltage side.

Calculate the circuit constant and show on an equivalent circuit.

2. (a) Explain the following three phase transformer connections : [7]
- (i) Delta - Delta
 - (ii) Star - Star
- (b) A 3-phase transformer is used to step down the voltage of a 3-phase, 11KV feeder line, per phase turns ratio is 12 for a primary line current of 20 A, Calculate the secondary line voltage, line current and output KVA for the following connections : [7]
- (i) Star - Delta
 - (ii) Delta - Star
3. (a) Derive the emf equation of d.c. generator. [7]
- (b) A shunt generator gives full load output of 30KW at a terminal voltage of 200V. The armature and shunt field resistances are 0.05 ohm and 50 ohm respectively. The iron and friction losses are 1000 W. Calculate : [7]
- (i) generator emf
 - (ii) copper losses

- (c) efficiency
4. (a) A 120V d.c. shunt motor having an armature circuit resistance of 0.2 ohm and field circuit resistance of 60 ohm draws a line current of 40 A at full load. The brush voltage drop is 3V and rated full load speed is 1800 rpm. Calculate : [7]
- (i) The speed at half load
- (ii) The speed at 125% of full load
- (b) Discuss different methods of speed control of d.c. motor. [7]
5. (a) Discuss commutation in d.c. machines. Also, explain the methods of improving commutation. [7]
- (b) An 8 pole generator has 500 armature conductors and has a useful flux per pole of 0.065 Wb. What will be the emf generated, if it is lap connected and runs at 1000 rpm ? What must be the speed at which it is to be driven to produce the same emf, if it is wave wound ? [7]

6. (a) What is the necessity of a starter for a d.c. motor ? Explain, with a neat sketch, the working of a 3 point starter. [7]
- (b) A 240V d.c. series motor takes 40A when giving its rated output is at 1500 rpm, its resistance is 0.3 ohm. Calculate the value of resistance that must be added to obtain the rated torque : [7]
- (i) at starting
- (ii) at 1000 rpm
7. (a) Explain tap changing transformer. Also write the comparison between three winding transformer and tap changing transformer. [7]
- (b) (i) Explain the principle of transformer action.
- (ii) Derive an expression for the emf induced in a transformer winding show that emf per turn in primary is equal to the emf turn in the secondary. [7]
8. (a) Draw and explain the characteristics of d.c. compound motor. [7]
- (b) Why is the starting current very high in a d.c. motor ? Explain it. [7]