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A – 6617

Reg. No. : .....

Name : .....

Combined First and Second Semester B.Tech. Degree Examination, December 2016

13.108 : BASIC ELECTRICAL ENGINEERING (ABCHMNPSTU)

(2013 Scheme)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Give an example for single and multiple excitation systems.
2. What is coefficient of coupling ?
3. Mention the different sources of energy.
4. Derive the relation between line and phase voltage.
5. Why DC series motor is called variable speed motor ?
6. The emf per turn for a single-phase 2200/220 V, 50 Hz transformer is 11 V. Calculate the number of primary and secondary turns.
7. Why a starter is required to start a DC motor ?
8. What is the necessity of earthing ?
9. Name the different types of lamps.
10. Explain about uniform tariff.

PART – B

Answer **any one full** question from **each** Module. **Each** question carries **20** marks.

Module – I

11. a) Define the following terms : **10**
    i) MMF and Lenz's Law.
    ii) Faraday's Law of Electro Magnetic Induction.

P.T.O.

b) A smooth core armature working in a 4-pole field magnet has a gap (iron to iron) of 0.5 cm. The area of the surface of each pole is 0.1 m^2. The ampere-turns absorbed by each pole are 3000. Calculate

i) The mechanical force exerted by each pole on the armature

ii) Energy stored in the four air gaps. **10**

OR

12. Define what a capacitance is. Deduce an expression for the equivalent capacitance of three capacitors connected in

a) Parallel

b) Series

Hence calculate the equivalent capacitance if three capacitors of capacitances 2, 4 and 8 Micro-Farads are connected in

i) Series

ii) Parallel.

If a voltage of 10 V is applied across the combination, calculate the charge stored in each case. **20**

Module – II

13. a) Describe the method of measurement of reactive power in three phase circuit using single dynamometer type wattmeter. **10**

b) The power flowing in a 3-phase, 3 wire balanced load system is measured by two wattmeter method. The reading of wattmeter A is 7500 W and of wattmeter B is-1500 W.

i) What is the power factor of the system ?

ii) If the voltage of the circuit is 400 V, what is the value of capacitance which must be introduced in each phase to cause whole of the power measured to appear on wattmeter ? The frequency is 50 Hz. **10**

OR

14. a) Draw a general layout of a modern thermal power plant and explain the working of different circuits. **10**

b) Explain the function of the following in thermal power plant and explain the principle of operation of each :

i) Economiser

ii) Electrostatic precipitator

iii) Condenser

iv) Superheater

v) Cooling tower. **10**

Module – III

15. a) Draw and explain the OCC Characteristics and External Characteristics of DC generator. **10**

    b) Two DC shunt generators are connected in parallel to supply a load of 5000 A. Each machine has an armature resistance of 0.03 Ω and field resistance of 60 Ω, but the emf of one machine is 600 V and that of the other machine is 640 V. What power does each machine supply ? **10**

OR

16. a) Describe the constructional features of a salient pole synchronous generator. **10**

    b) A 3-phase, 50 Hz star connected alternator runs at 600 rpm. It has 60 stator slots with 4 conductors/slot. The flux per pole is 0.06 wb per pole and is sinusoidal. Determine the phase and line emf's. What harmonics do you expect due to slots ? **10**

Module – IV

17. a) Explain with a neat sketch the working principle of a filament lamp. **10**

    b) It is required to provide an illumination of 100 lux in a factory hall of 40 m × 10 m. Taking depreciation factor to be 0.8, coefficient of utilization to be 0.4 and the efficiency of the lamp as 14 lumens/watt, calculate the number of lamps and determine their disposition. **10**

OR

18. a) What are the various types of tariff's ? Name them and explain briefly about each of them. **10**

    b) A generating station has a maximum demand of 75 MW and a yearly load factor of 40%. Generating costs including station costs are Rs. 80 per annum per kW demand plus 1 paise per kWh transmitted. The annual capital charge for transmission system is 20 lakhs and for distribution system Rs. 15 lakhs, the respective diversity factor being 1.2 and 1.5. The efficiency of transmission system is 90% and the distribution system is 85%. Find the yearly cost per kW demand and kWh supplied at substation and at consumer premises. **10**