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Total Pages : 05

D-180226

B. Tech. EXAMINATION, 2018

Semester : Common with I(CBS) & II(CBS)

PRINCIPLES OF ELECTRICAL ENGINEERING

(Gp. B)

EE-101

Time : 3 Hours *Maximum Marks : 60*

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Sections A, B, C and D. Section E is compulsory.

Section A

1. (a) Draw and explain the functions of each component in the water-steam flow diagram of a coal-fired thermal power plant. **6**

(b) What are the main parts of a nuclear reactor ? Explain their functions. **4**

2. (a) A 100 V, 60 W bulb is connected in series with a 100 V, 100 W bulb and the combination is connected across 200 V mains. Find the value of the resistance that should be connected across the first bulb, so that each bulb may get proper current at the proper voltage. **6**

(b) Derive the relationship to express three delta connected resistance into an equivalent star connection. **4**

Section B

3. (a) Explain the mathematical expression that power consumed in a pure capacitance is zero. **4**

(b) A coil is connected in series with a non-inductive resistance of 40 Ω across 230 V, 50 Hz supply. The potential difference across the coil is 170 V and across the resistance is 125 V. Calculate the (i) power absorbed by the coil, (ii) inductance of the coil, (iii) resistance of the coil and (iv) power factor of the whole circuit. **6**

4. (a) A three-phase delta connected load with its each phase having an inductive reactance of 38Ω and a resistance of 22Ω is fed from the secondary of a three-phase star connected transformer. The secondary has a phase voltage of 230 V. Draw the circuit diagram of the system and find the (i) voltage across each phase of the load, (ii) current in each phase of load, (iii) current in the transformer secondary winding and power factor and (iv) total power taken from the supply. https://www.hptuonline.com 6

(b) Explain with the help of necessary diagrams, how you can interconnected the three-phases of an AC systems to obtain (i) star connection and (ii) delta connection. Mark the polarity of windings carefully. 4

Section C

5. (a) Discuss the advantages, limitations and applications of moving iron instruments. 6

(b) Explain the working of electrodynamics type instruments. 4

6. (a) Define the term mmf magnetic flux and magnetic reluctance. Also, establish the relation which holds between these quantities for a magnetic circuit. 5

(b) Explain the magnetic hysteresis and the importance of the hysteresis loop. Derive the expression for the hysteresis loss. 5

Section D

7. (a) Derive the emf equation of a transformer. On what factors does the induced emf in a winding depend ? Show that the emf induced per turn in primary is equal to the emf per turn in secondary. 5

(b) A 600 V/150 V, 10 kVA two-winding transformer is to be used as an auto-transformer to supply power at 600 V from 750 V supply. Draw the connection diagram and determine the kVA capacity as an auto-transformer. 5

8. (a) Explain the open circuit characteristics (OCC) of a DC generator and explain how to draw the open circuit characteristic (OCC) for voltage built up. 5

(b) Draw the circuit diagram of a capacitor start capacitor run single phase induction motor and explain the working. Also mentioned its common uses. 5

Section E

9. (a) Discuss the different sources of energy.

(b) What is power factor ? Discuss the practical importance of power factor.

(c) What are the various types of secondary instruments ?

(d) Distinguish between core type and shell type transformers.

(e) Derive the torque equation of a DC motor.

5×4=20