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C14-EC-306

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BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2016

DECE—THIRD SEMESTER EXAMINATION

ELECTRICAL TECHNOLOGY

Time : 3 hours] [*Total Marks* : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define impedance of an AC circuit. Give its units.

2. State the conditions for series resonance.

3. Find the resonant frequency of RLC series circuit having resistance 10 Ω, an inductance 10 mH and capacitance 50 μF.

4. State Faraday's laws of electro-magnetic induction.

5. Compare DC series motor and DC shunt motor in any three aspects.

6. List the merits of three-phase system over single-phase system.

7. Define mutual inductance and give its units.

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8. Draw a neat sketch of Y-Δ connected configuration of three-phase transformer.

9. State the applications of synchronous motor.

10. Draw a neat sketch of torque-speed characteristics of a three-phase induction motor.

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A pure inductive coil is connected in series with a resister to 50 Hz AC supply. The voltages across the resistor and inductive coil are 40 V and 60 V respectively. Find the value of resistor, inductance of the coil, supply voltage and power factor of the circuit if the current is 4 A. Also draw neat circuit diagram. 10

12. Two impedances $(Z_1 = 6 + j8)\Omega$ and $(Z_2 = 8 - j6)\Omega$ are connected in parallel. If the supply voltage is 200 V, 50 Hz., calculate the total *(a)* conductance, *(b)* susceptance, *(c)* admittance, *(d)* current and *(e)* power factor of the circuit. 10

13. An inductive coil having resistance R and an inductance L is connected in parallel with a capacitance C. If this parallel combination is supplied with an AC supply of variable frequency, derive the expression for resonant frequency. 10

14. With the neat sketch, of circuit diagram and graph, explain open-circuit characteristics of DC shunt generator. 10

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15. *(a)* Explain briefly the significance of back EMF in DC motors. 4

(b) A 220 V DC shunt motor has an armature resistance of $0 \cdot 8\,\Omega$ and field resistance of 200 Ω. Determine the back EMF when giving an output of 7460 W at an efficiency of 85%. 6

16. With a neat line diagram, explain the basic principle of operation of nuclear power plant. 10

17. *(a)* Draw a neat vector diagram of single-phase transformer on load at lagging power factor. 4

(b) The no-load current of a single-phase transformer is 5 A at 0·3 pf lag, when supplied at 230 V, 50 Hz AC source. The number of turns on the primary winding is 200. Find *(i)* the maximum value of flux in the core, *(ii)* active and reactive components of currents and *(iii)* iron loss. 6

18. With neat waveforms and vector diagrams, explain the principle of production of rotating magnetic filed in three-phase induction machines. 10

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