7040

BOARD DIPLOMA EXAMINATION, (C-20)

JANUARY—2023

DEEE – FIRST YEAR EXAMINATION

BASIC ELECTRICAL ENGINEERING

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. Distinguish between conductor and insulator based on valence electrons.

2. Define *(i)* resistance, *(ii)* potential and state its SI units.

3. Write the relations between mechanical, electrical and thermal units of work.

4. Write any three merits of CFL lamps.

5. State how the heat is produced due to flow of electric current.

6. Define *(i)* magnetic field and *(ii)* magnetic flux density and state its SI units.

7. State Fleming's left hand rule.

8. Define coefficient of coupling.

9. State Lenz's law.

10. Three capacitors having capacitances of 8μF, 4μF and 12μF. Find the total capacitance when they are connected in series.

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

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

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

11. *(a)* Derive an expression for division of current between resistances when two resistances are connected in parallel.

(OR)

(b) The resistance of a conductor at 10 °C is 5 Ω and at 100 °C is 12 Ω. Find the resistance at 0 °C and also find the temperature coefficient at 40 °C.

12. *(a)* Find the current taken by a 400 V DC motor driving on pump to raise 1000 litres of water per minute to a height of 25 meters above the level of the sump. The efficiency of motor is 80% and pump efficiency is 90%.

(OR)

(b) Calculate the bill of electricity charges of February month bill at 50 paise/unit, if the meter rent per month is ` 5 for the following loads fitted in an electrical installation :

     (i)   10 lamps 60 watt each working 5 hours a day

     (ii)   5 ceiling fans 120 watt each working 10 hours a day

     (iii) 2 kW heater working 4 hours a day

     (iv) 2 HP motor with efficiency 80% working 4 hours a day

*

13. *(a)* A coil of 500 turns and resistance of 20Ω is wound uniformly on iron ring of mean circumference 50 cm and cross-sectional area 4 cm^2. It is connected to 24 V DC supply. Under these conditions the relative permeability of iron is 800. Calculate *(i)* magneto motive force (m.m.f.), *(ii)* reluctance of the magnetic path and *(iii)* the total flux in the ring.

(OR)

(b) Derive an expression for magnitude of the force on a conductor in a magnetic field.

*

14. *(a)* Derive an expression for energy stored in a magnetic field.

(OR)

(b) Two identical coils *A* and *B* consisting of 1500 turns each lie in parallel planes such that 70% of the flux produced by the coil *A* link the coil *B*. Current of 4A flowing in the coil *A* produces in it a flux of 0·04 m.w.b. Calculate the coefficient of coupling between them.

15. *(a)* Three identical point charges, each of +5µ C are placed at the vertices of an equilateral triangle 10 cm apart. Calculate the force on each charge. Assume the medium is air.

(OR)

(b) A parallel plate capacitor has plates of area of 2 m^2 spaced by 3 slabs of relative permittivities 2, 3, 6 and thickness 0·4 mm, 0·6 mm, 1·2 mm respectively. Calculate the capacitance of the capacitor.

PART—C
10×1=10

Instructions : (1) Answer the following question.

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

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

16. The force between two long parallel conductors is 15 kg/metre. The conductors spacing is 10 cm. If one conductor carries twice the current of the other, then what will be the current flow in each conductor?

★ ★ ★

www.manaresults.co.in