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C20-EE-106

7040

BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DEEE – FIRST YEAR EXAMINATION

BASIC ELECTRICAL ENGINEERING

Time : 3 hours]

[Total Marks : 80

PART—A

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. State the laws of resistance. 3
2. Two resistors having resistances $6\ \Omega$ and $2\ \Omega$ are connected in series. What resistance must be connected across $6\ \Omega$ resistor to give the total resistance of the circuit $4\ \Omega$? 3
3. Define electrical energy and state its unit. 2+1=3
4. Define thermal efficiency. 3
5. State Joule's law of electric heating.
6. State Fleming's left-hand rule.
7. Determine the reluctance of a cylindrical steel rod of length 120 mm and diameter 40 mm. Take the relative permeability of the steel as 1000. 3

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8. State Lenz's Law. 3
9. Define (a) self-inductance and (b) mutual inductance. $1\frac{1}{2}+1\frac{1}{2}=3$
10. State Gauss theorem. 3

PART—B

Instructions : (1) Answer all questions.

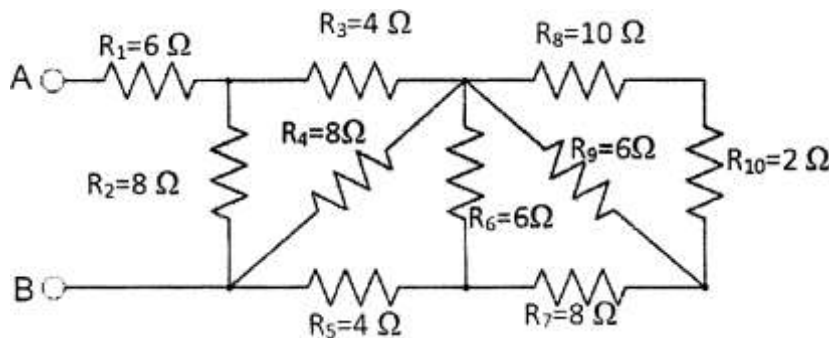
(2) Each question carries eight marks.

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

11. (a) Derive an expression for equivalent resistance when three number of Resistances are connected in SERIES. 8

(OR)

- (b) Calculate the equivalent resistance for the following circuit and find the current drawn by the circuit if a p.d. of 50 V is connected across A and B terminals. $6+2=8$



12. (a) Two bulbs rated 60 W at 220 V and 100 W at 220 V are connected in series across a 220 V DC supply. Calculate the power absorbed by each lamp. If the above two bulbs are connected in parallel across the 220-V DC supply, what is the power absorbed by each lamp? $4+4=8$

* (OR)

(b) A house has the following loads :

- (i) 10 lamps of 60 W each working for 10 hrs./day
- (ii) 1 electric iron of 450 W working for 1 hr./day
- (iii) 8 fans of 80 W each working for 12 hrs./day
- (iv) 1 heater of 1000 W working for 1 hr./day
- (v) 1 refrigerator 250 W working for 12 hrs./day

Calculate the monthly bill if rate of charge per unit is R 1.20 plus ₹ 20 as meter rent for the month of June.

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13. (a) A circular iron ring of 20 cm in diameter has an air-gap of 1 mm wide cut in it. The area of the cross-section of the ring is 3 cm × 6 cm. Calculate the number of ampere-turns needed to setup a flux of 0.5 milli weber in the air gap. Neglect leakage and fringing. Assume relative permeability for iron is 800.

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(OR)

(b) Compare between magnetic and electric circuits in any eight aspects.

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14. (a) Derive the expression for energy stored in a magnetic field and also the derive expression for the energy stored per unit volume.

5+3=8

(OR)

(b) State the coefficient of coupling and derive an expression for lifting power of a magnet.

3+5=8

15. (a) Three capacitors, having capacitances 4.0 μF, 6.0 μF and 8.0 μF respectively, are connected (a) in parallel and (b) in series across a source of e.m.f. of 48 V. Calculate the total energy stored by the combination in each case.

4+4=8

(OR)

(b) Draw the field pattern of the following :

2×4=8

- (i) isolated positive charge
- (ii) isolated negative charge
- (iii) two positive charges
- (iv) two negative charges

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PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) Its carries ten marks.

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

16. (a) A soldering iron is rated at 50 watt when connected to a 250 V supply. If the soldering iron takes 5 minutes to heat to a working temperature of 200 °C from 19 °C, find its mass, assuming it to be made of copper. Given specific heat capacity of copper is 390 J/kg/°C.

(b) A coil having 2200 turns produces a flux of 25 mWb when a current of 3 A passes through it. Find (i) the inductance of the coil, (ii) the energy stored in the magnetic field and (iii) the e.m.f. induced if the current falls to zero in 40ms. 5+5=10

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