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C16-EE-106

6040

BOARD DIPLOMA EXAMINATION, (C-16)

JANUARY/FEBRUARY—2022

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. List any three merits of electrical energy over other types of energy.
2. Define temperature coefficient of resistance and give its unit.
3. Define (a) electrical power and (b) electrical energy and mention their units.
4. Define thermal efficiency and mention the specific heat of water in SI system.
5. Draw the magnetic field patterns due to (a) straight current carrying conductor and (b) solenoid.
6. Define (a) reluctance and (b) magnetic flux density and mention their units.
7. State Fleming's right hand rule and where it is applied.
8. Calculate the energy stored in a coil having a self-inductance of 0.6 mH, when a current through the coil rises from 0 to 5A.
9. State coulomb's laws of electrostatics.
10. Define capacitance and state formula for the capacitance of parallel plate capacitor.

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PART—B

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

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

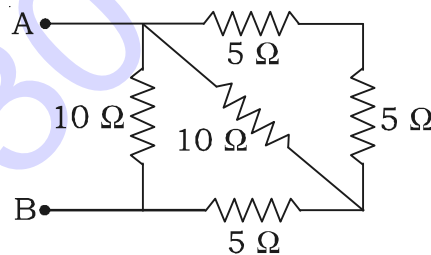
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. (a) Derive an expression for resistance at any temperature as $R_t = R_0(1 + \alpha_0 t)$. 4

(b) A copper coil has a resistance of 25Ω at 20°C and 28.225Ω at 50°C . Find (i) temperature co-efficient at 0°C and (ii) resistance of the coil at 0°C . 6

12. (a) Derive an expression for equivalent resistance when three resistors are connected in parallel. 5

(b) Find the equivalent resistance of the circuit (R_{AB}) shown in fig. below : 5



13. Calculate the bill of electricity charges for the following loads fitted in an electrical installations :

(a) 10 lamps 60 W each working 5 hours a day

(b) 5 ceiling fans 120 W each working 10 hours a day

(c) 2 kW heater working 4 hours a day

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

Calculate the monthly bill for February 2020 at 50 paise/unit, if the meter rent per month is ₹5.

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- 14.** (a) List any four merits of CFL and LED lamps over incandescent lamps from power consumption point of view. 4
- (b) Explain the working of (i) electric iron and (ii) metal filament lamp with neat sketches. 3+3
- 15.** A ring made up of iron has a cross-sectional area of 4.91 cm^2 . It has an air gap of 1 mm wide and a net iron path of 94.15 cm. It is uniformly wound with 500 turns of wire. Calculate the current required by the exciting coil to produce a total flux of 4 mwb. Assume a relative permeability of iron is 800. Neglect leakage and fringing. 10
- 16.** (a) Derive an expression for self and mutual inductance. 3+3
- (b) Explain dynamically induced e.m.f. 4
- 17.** (a) Derive an expression for equivalent inductance when two inductances are connected in series-opposing. 5
- (b) The equivalent inductance of two identical coils connected in series is 4 H and 0.8 H. Determine the self-inductance of each coil and the coefficient of coupling. 5
- 18.** (a) Derive an expression for the energy stored in a capacitor. 6
- (b) Two capacitors of $4 \mu\text{F}$ and $6 \mu\text{P}$ are connected in series across a 100 V DC supply. Find the total energy stored in them. 4

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