



C-14-EE-106

4046

BOARD DIPLOMA EXAMINATION, (C-14)

APRIL/MAY—2015

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

1. State Ohm's law.
2. Define the terms (a) resistance and (b) resistivity.
3. Define work, power and energy, and give their SI units.
4. Define thermal efficiency.
5. Give expressions for field strength (a) at centre of circular conductor, (b) at any point on the axis of a circular conductor and (c) around a straight conductor.
6. State Fleming's left-hand rule and its application.
7. State and explain Lenz's law.
8. Define coefficient of coupling and calculate the coefficient of coupling for two coils having self-inductances of 60 mH and 80 mH. The mutual inductance between them is 40 mH.

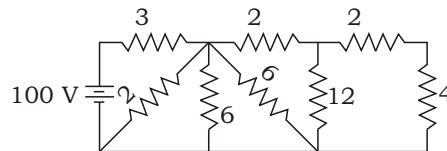
9. Define absolute and relative permittivity.
10. The capacitance of a capacitor formed by two parallel metal sheets, each  $100 \text{ cm}^2$  in area, separated by a dielectric 2 mm thick is  $2 \times 10^{-10} \text{ F}$ . Determine the relative permittivity of the dielectric.

**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) Derive the expression for equivalent resistance when three resistances are connected in parallel. 5  
 (b) The resistance of 360 m of a wire is 90  $\Omega$ . How much length of the same volume of wire will have a resistance of 125  $\Omega$ ? 5
12. Find the total current  $I$  in the given circuit : 10



13. A house has the following loads :
- (a) 8 lamps 60 W each working for 6 hr/day
  - (b) 5 fans 80 W each working for 8 hr/day
  - (c) 3 electric heaters 1000 W each working for 2 hr/day
  - (d) 1 electric motor 1.5 HP working for 4 hr/day at an efficiency of 80%
- Calculate the electricity bill if rate per unit is ₹ 1.5 plus ₹ 15 as meter rent for the month of September. 10

14. (a) List the application of (a) space heater and (b) infrared lamp. 4  
 (b) An electric heater contains 4 liters of water initially at a mean temperature of  $15^\circ \text{C}$ . 0.25 kWh is supplied to the water by the heater. Assuming no heat losses, what is the final temperature of the water? 6

15. (a) Derive an expression for magnitude of the force on a conductor in a magnetic field. 4
- (b) A straight conductor of length 0.5 m and carries a current of 100 A is placed in a uniform magnetic field of flux density 1.5 tesla. Calculate the force developed on a conductor, when it is placed (i) at right angle, (ii) in parallel and (iii) at an angle of  $30^\circ$  to the magnetic field. 6
16. (a) Derive an expression for lifting power of a magnet. 4
- (b) An inductor with 10  $\Omega$  resistance and 200 mH inductance is connected to 24 V d.c. supply. Calculate the energy stored in the inductance and power absorbed. 6
17. (a) Explain the self-inductance and derive an expression for it. 6
- (b) A coil has 400 turns. Find the induced e.m.f. in it, if the flux changes from 0.2 mWb to 1 m Wb in 0.2 second. 4
18. (a) State and explain Columb's law of electrostatics. 4
- (b) Derive an expression for the capacitance of a parallel-plate capacitor. 6

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