



C14-EE-106

4046

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

DEEE - FIRST YEAR EXAMINATION

BASIC ELECTRICAL ENGINEERING

Time : 3 Hours]

[Total Marks : 80

PART - A

4×10=40

- Instructions :**
- (1) Answer **ALL** questions.
 - (2) Each question carries **FOUR** marks (Two marks for each bit).
 - (3) Answer should be brief and straight to the point and shall not exceed five simple sentences.

- 1 (a) State Ohm's law.
(b) How much resistance is required to limit the current to 10A, if the potential drop across the resistor is 15V ?
- 2 (a) Define specific resistance and state its units.
(b) Calculate the total equivalent resistance when three resistors of 30Ω , 40Ω and 15Ω are connected in series.
- 3 (a) Define efficiency ' η ' and state its units.
(b) Define work and power from electrical aspects.
- 4 (a) State Joule's law of electric heating.
(b) List electrical appliances using the heating effect of electric current.
- 5 (a) Define Permeability and state its units.
(b) Define reluctance and state its units.
- 6 (a) State Biot-Savarts (Laplace) Law.
(b) Plot the field pattern due to a solenoid.

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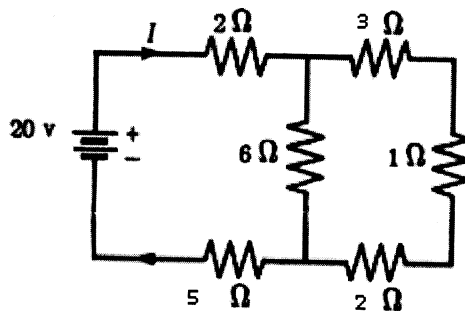
- 7 (a) Define electromagnetic induction.
 (b) State Faradays II law of electromagnetic induction.
- 8 (a) State Lenz's law.
 (b) Define coefficient of coupling.
- 9 (a) Define absolute permittivity and state its units.
 (b) State the coulomb's law of electrostatics.
- 10 (a) Define Capacitance and state its units.
 (b) A $50\mu\text{F}$ air insulated parallel plate capacitor is charged to 200V.
 Calculate the energy stored in the capacitor.

PART - B**10×4=40**

Instructions :

- (1) Answer any **FOUR** questions.
- (2) Each question carries **TEN** marks.
- (3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 11 (a) Derive an expression for equivalent resistance when three resistances are connected in parallel.
 (b) Calculate the current drawn from source 'T' by the following circuit :



- 12 (a) Explain the effect of temperature on resistance of conductors, semi conductors and insulators.
 (b) Derive an expression for resistance at any temperature
 $R_t = R_o(1 + \alpha_o t)$.

- 13 (a) A house has following load pattern.
(i) 10 lamps of 60W each working for 8 hrs/day.
(ii) 3 fans of 80W each, working for 12 hrs/day and
(iii) an immersion water heater of 1000W working 2hrs per day.
Calculate the January month electricity bill at the rate of Rs. 3 per unit and meter rent as Rs. 10 per month.
- (b) Two lamps of rating 230V, 100W and 230V, 200W are connected in series across a 200V supply. Calculate the power dissipation of each lamp.
- 14 (a) Explain the operation of electric cooker.
(b) An electric heater contains 4 liters of water initially at a mean temperature of 15°C and 0.25kWh is supplied to the water by the heater. Assuming there is no heat loss. Calculate the final temperature of the water ?
- 15 (a) Derive an expression for the magnitude of force exerted on a current carrying conductor in a magnetic field.
(b) A ring made of iron has a cross-sectional area of 4.91 cm². It has an air gap of 1 mm wide and net iron path of 94.15 cm. It is uniformly wound with 1000 turns of wire. Calculate the current required by the exciting coil to produce a total flux of 4×10^{-3} wb. Assume a relative permeability of iron at this flux density as 600. Neglect leakage and fringing.
- 16 (a) Derive an expression for the lifting power of a magnet.
(b) Find the area required for such an electromagnet to have a lifting power of 400kg with a flux density of 0.1 Wb/m².
- 17 (a) Obtain an expression for the energy stored in a magnetic field.
(b) A coil of 2000 turns is wound on a toroidal magnetic core having reluctance of 10^6 AT/wb. When the coil current is 4 A and is increased at a rate of 150A/sec determine :
(i) Inductance of the coil.
(ii) Energy stored in the magnetic field and
(iii) e.m.f induced in the coil.
- 18 (a) Obtain an expression for the capacitance of a parallel plate capacitor.
(b) Three capacitors having capacitances of 10F, 50F and 25F are connected in parallel across a supply voltage 250V. Calculate (i) equivalent capacitances (ii) Potential difference across each capacitor, and (iii) Charge on each capacitor.