TED (15) 2031
(Revision 2015)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2020.

BASIC ELECTRICAL ENGINEERING

(Maximum Marks :75) [Time : 2.15 hours]

PART–A

Marks

I. Answer **any three** questions in one or two sentences. Each question carries 2 marks.

1. State Ohm's law.
2. State maximum power transfer theorem.
3. Define dielectric strength of a medium.
4. State Lenz's law.
5. List any two applications of electromagnets. (3x2=6)

PART - B

II Answer **any four** of the following questions . Each question carries 6 marks.

1. Explain the effect temperature on resistance.
2. Derive an equation to obtain the equivalent resistance of three resistors which are connected in (a) Series (b) Parallel.
3. Explain the steps for finding Thevenin's equivalent circuit.
4. Define the following.
   (i) Electric flux density (ii) Electric field strength (iii) Potential gradient.
5. Derive the expression or parallel plate capacitor in a uniform dielectric medium.
6. Comparison between electric circuit and magnetic circuit.
7. State and explain Faraday's laws of electromagnetic induction.

[4x6 =24]

PART - C

(Answer **any of the three units** from the following. Each full question carries 15 marks)

UNIT I

III (a) State and explain Kirchhoff's current law and voltage law. (7)

(b) The resistance of the field coils of a dynamo is 173 Ω at 16^0C. After working for 6 hours on full load, the resistance of the coils increases to 212 Ω. Calculate (i) the temperature of the coils (ii)mean rise of temperature of the coils. Assume temperature co-efficient of resistance of copper is 0.00426/^{0}C at 0^0C. (8)

OR

IV (a) State and explain laws of resistance. (7)

(b) In a residential house, the following loads are connected.

(i) 10 lamps of 40W each switched on for 5 hours a day.

(ii) 5 fans of 60W each working 10 hours a day.

(iii) One 1000W heater working 2 hours a day.

(iv) One refrigerator 250W working 20 hours a day.

If the cost of energy is Rs.2/- per unit. Calculate the total cost of energy consumption for a month which has 30 days. (8)

UNIT- II

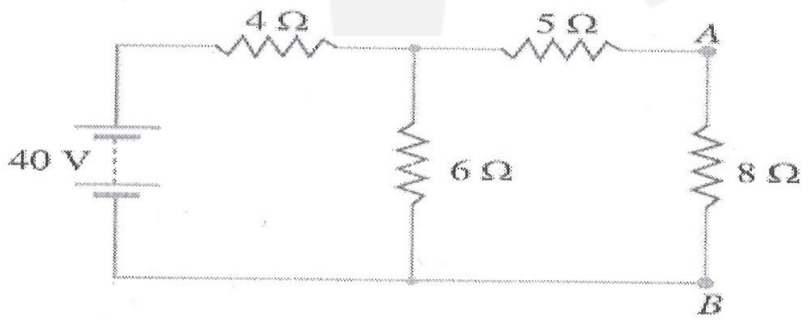
V (a) State and explain super position theorem. (7)

(b) A circuit consists of two parallel resistors, having resistance of 20 Ω and 30 Ω respectively, connected in series with 15 Ω resistor. If current through 15 Ω resistor is 3 A. Find (i) the current through 20Ω and 30 Ω resistors (ii) the voltage across the whole circuit and (iii) Total power. (8)

OR

VI (a) State and explain reciprocity theorem. (7)

(b) Find the current in the 8Ω resistor in the following circuit using Thevenin's theorem.



(8)

UNIT- III

VII (a) State and explain laws of electrostatics. (7)

(b) Derive the expression of potential at a point in a medium. (8)

OR

VIII (a) Derive the expression or energy stored in a capacitor. (7)

(b) Three capacitors of capacitance 200 μF, 50 μF and 10 μF are connected in series to 60V d.c supply. Find (1) The total capacitance (2)The charge on each capacitor (3) voltage across each capacitor. (8)

UNIT – IV

IX (a) Draw B-H curve and explain the various regions in the curve. (7)

(b) A mild steel ring has a mean diameter of 16 cm and a cross sectional area of $4cm^2$. Calculate the ampere turns to produce a flux of 400 μWb in the ring if the relative permeability of the material is 1000. Also find the reluctance of the ring. (8)

OR

X (a) Distinguish between dynamically induced emf and statically induced emf. (7)

(b) Derive the expression for co-efficient of magnetic coupling. (8)

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