

G 608

(Pages : 4)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2014**

**First and Second Semesters**

**BASIC ELECTRICAL ENGINEERING**

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 Admissions]

(Common for all Branches)

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 4 marks.*

1. Explain the terms : Electric potential and potential difference.
2. Discuss the analogy between electric and magnetic circuits.
3. Define RMS value and Average value of an alternating quantity.
4. Obtain the variation of instantaneous power in a purely inductive circuit.
5. Discuss the advantages of three-phase system.
6. Explain selectivity and Q factor of a coil.
7. Obtain the expression for Torque developed in a DC Motor.
8. Discuss, what is synchronous speed and slip of an induction motor.
9. Explain the method of determination of number of subcircuits in domestic wiring system.
10. Discuss the various Non-conventional methods of electrical power generation.

(10 × 4 = 40 marks)

**Part B**

*Answer all questions.*

*Each full question carries 12 marks.*

11. (a) The resistance of the field coil of a generator is  $173 \Omega$  at  $16^\circ\text{C}$ . After working for 6 hours on full-load, the resistance of coil increases to  $212 \Omega$ . Calculate the rise in temperature of the coil if the temperature coefficient of resistance of material is  $42.6 \times 10^{-6}/^\circ\text{C}$  at  $0^\circ\text{C}$ .

(4 marks)

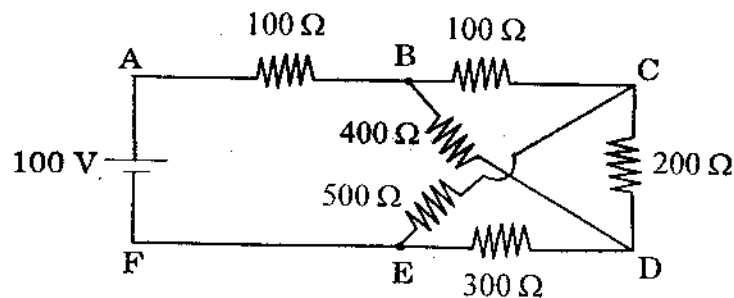
**Turn over**

- (b) A circular iron ring has a mean circumference of 1.5 m and a cross-sectional area of  $0.01 \text{ m}^2$ . A sawcut of 4 mm wide is made in the ring. Calculate the magnetising current required to produce a flux of 0.8 mWb in the air gap if the ring is wound with coil of 175 turns. Assume relative permeability of iron as 400 and leakage factor 1.25.

(8 marks)

Or

12. (a) Find the magnitude and direction of force on conductor carrying current placed in a magnetic field. (4 marks)
- (b) Determine the current supplied by the battery in the circuit shown. What is the power in  $200 \Omega$  resistor?

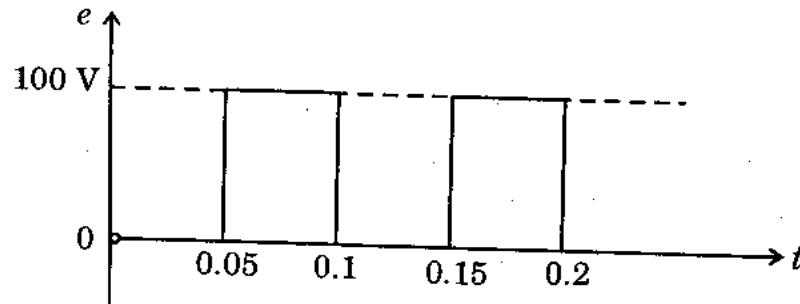


(8 marks)

13. (a) A sinusoidal current of frequency 60 Hz has a maximum value of 120 A. Reckoning time from the instant the current is zero and is becoming positive, find (a) the instantaneous value after  $1/360$  seconds; and (b) the time taken to reach 96 A for the first time. (4 marks)
- (b) Two impedances  $Z_1 = 10 + j15 \Omega$  and  $Z_2 = 6 - j8 \Omega$  are connected in parallel. If the total current supplied is 15 A, find the branch currents, voltage across the combination and circuit power factor. (8 marks)

Or

14. (a) Determine the form factor of the rectangular pulse shown in figure.



(6 marks)

- (b) A series RC circuit has  $4 \Omega$  resistance and is connected to 230 V, 50 Hz supply if the current drawn is 8.5 A, find the value of capacitance and circuit power factor. What is the voltage drop across the capacitance ?

(6 marks)

15. (a) A choking coil is connected in series with a  $20 \mu\text{F}$  capacitor. With a constant applied voltage of 200 V, it is found that the circuit takes a maximum current of 50 A, when the supply frequency is 100 Hz. Calculate (i) the resistance and inductance of choking coil and voltage across the capacitor ; (ii) Q factor of coil.

(6 marks)

- (b) Obtain the relation between line and phase values of voltage and current in a three-phase star connected system.

(6 marks)

Or

16. (a) Obtain the variation of inductive and capacitive reactances, impedance and current against frequency, in a series RLC circuit. What is the resonant frequency ?

(6 marks)

- (b) A balanced 3-phase load consists of 3 coils each of resistance  $6 \Omega$  and inductive reactance of  $8 \Omega$  connected in delta across 400 V, 3-phase supply. Calculate the line currents and power absorbed.

(6 marks)

17. (a) Explain the principle of operation of single-phase induction motor.

(8 marks)

- (b) A shunt generator delivers 450 A at 230 V. The resistances of armature and shunt field are  $0.3 \Omega$  and  $50 \Omega$  respectively. Calculate the generated e.m.f.

(4 marks)

Or

Turn over

18. (a) Explain the operation of Transformer on load. Why core loss is constant for the transformer ? (8 marks)
- (b) Discuss different types of alternators. (4 marks)
19. (a) With layout explain the operation of a Thermal power station. (8 marks)
- (b) Explain the working of Fluorescent lamp. (4 marks)

Or

20. (a) A room 5 m × 3 m is to be provided with electrical wiring. The load requirement includes 2 light points, 1 fan point and 1 plug point. The ceiling height is 3 m and thickness of wall is 0.3 m. Draw a layout and prepare the list of materials required for the wiring. (8 marks)
- (b) Distinguish between feeder, distributor and service mains. (4 marks)

[5 × 12 = 60 marks]