MODEL PAPER I

BE-104
BASIC ELECTRICAL & ELECTRONICS

NOTE: Attempt one question from each unit. All question carry equal marks.
Max. Marks-70                                                                 Time 03:00 h

UNIT-01

Q.01(a): State Superposition Theorem & Use superposition theorem to find the current in AB branch (7)

(b): Define Star-Delta transformation & Derive the equations for
(1) Delta to Star       (2) Star to Delta   (7)

OR

Q.02(a): Establish the relationship between line and phase voltages and currents in a balanced 3-phase star connection. Draw complete phasor diagram for voltages and currents. (7)

(b): A resistor of 100Ω is connected in series with a 56µF capacitor to a supply at 230V, 50 Hz. Find (i) the impedance (ii) the phase angle (iii) the power factor (iv) the current (v) the voltage across the resistor & the across the capacitor. (7)
UNIT -02

Q.03(a): (a) Define the following terms: (7)
(1) MMF (2) Reluctance (3) Flux (4) Permeance (5) Flux Density

(b): What is the basic principle of operation of a transformer & Derive emf equation of a transformer. (7)

OR

Q.04(a): Draw the phasor diagram of a single phase transformer at (1) Inductive load (2) Capacitive load (3) Resistive load (7)

(b): The following results were obtained on a 50kVA, 2400/120 V single phase transformer:
(1) OC test on the lv side: 396W, 9.65A, 120V
(2) SC test on the hv side: 810W, 20.8A, 92V

UNIT -03

Q.05(a): Explain the construction & basic principle of DC machine. (7)

(b): Derive an expression for emf equation of DC machine. (7)

OR

Q.06(a): Explain the construction & working principle of Synchronous motor. (7)

(b): Explain the construction & working principle of Induction motor. (7)

UNIT -04

Q.07(a): Classify the conductor, insulator and semiconductor on the basis of energy band diagram. (7)

(b): The voltage across a silicon diode at room temperature of 300 K is 0.71 V when 2.5 mA current flows through it. If the voltage increases to 0.8 V, calculate the new diode current. (7)

OR

Q.08(a): Explain the V-I characteristics of PN Junction diode. Also explain the effect of Temperature on V-I characteristics. (7)
(b) Explain the conduction of charge carriers in intrinsic and extrinsic semiconductors. (7)

UNIT -05

Q.09(a): Explain the working and applications of zener diode or Tunnel diode. (7)

(b): Explain the various modes of operation of transistor. (7)

OR

Q.10(a): Explain the working of transistor as an amplifier. (7)
(b) State and prove Demorgan’s Theorem (7)
NOTE: Attempt one question from each unit. All question carry equal marks.
Max. Marks-70

Time 03:00 h

Unit I

Q.1 (a) What is superposition theorem? Explain with Example? (7)

(b) A bridge network ABCD has AB = 6ohm, BC = 12ohm, CD = 10ohm, and DA=3 ohm. A galvanometer of resistance 20 ohm is connected between B and D and a battery of e.m.f. of 2V and negligible resistance is connected between A and C. Calculate the current in the galvanometer. (7)

Or

Q.2 (a) What is KVL? Explain derive with one example? (7)

(b) State Thevenin’s theorem. Find current through branch AB using Thevenin’s theorem. (7)

Unit II

Q.3 – (a) Explain Open and Short Circuit Test? (7)

(b) A 220/2200V transformer with open circuit secondary takes a current of 6A at a 0.3 lagging Power factor. Calculate (a) Core loss (b) Iron loss Current (c) Magnetizing Current (7)

Or

Q.4 - (a) Derive the expression of Maximum Efficiency of Transformer? (7)

(b) A 100 – KVA lighting transformer has a full-load loss of 3 KW, the losses being equally divided between iron and copper. During a day the transformer operates on full load for 3 hours, one half-load for 4 hours, and the output being negligible for the remainder of the day. Calculate all day efficiency. (7)

Unit III

Q.5- (a) Explain Working of Synchronous Machine? (7)

(b) Write the types of Induction Machine? (7)

Or
Q.6-(a) Explain the Principle of DC Machine?  
(b) What are the types of DC Machine?  

Unit IV
Q.7 (a) Classify the various types of semiconductor materials.  
(b) Explain the working of Diode as a rectifier.  

Or
Q.8 (a) A germanium diode has a reverse saturation current of 3 μA. Calculate the voltage at which 1 % of the rated current will flow through the diode at room temperature if diode is rated for 1 A.  
(b) Explain the input output characteristics of PN Junction diode. Also explain the effect of temperature on V-I characteristics.

Unit V
Q.9 (a) Explain the working and applications of Light emitting diode or PIN diode.  
(b) Explain various types of Logic Gates with their symbolic representation.  

Or
Q.10 (a) Explain the three Transistor configurations in detail. Also compare them.  
(b) Explain various types of Number system used in digital system.