

ELECTRICAL & ELECTRONICS ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer all questions
All questions carry equal marks

PART – A
(Electrical Engineering)

UNIT – I

- 1 (a) What is meant by residual magnetism, derive the expression for generated e.m.f in d.c shunt generator?
(b) A shunt generator has a no-load voltage of 250 V when running at a speed of 800 rpm. The terminal voltage drops by 8% when the generator is delivering full load. If the resistances of the armature and the field windings are 0.08Ω and 92Ω respectively, compute the: (i) Output. (ii) Input torque of the generator at full load.

OR

- 2 (a) Explain the principle and operation of DC machine working as motor.
(b) Discuss the characteristics of dc motors.

UNIT – II

- 3 (a) Obtain the equivalent circuit referred to primary side of single phase transformer.
(b) The open circuit and short circuit tests on a 4-kVA, 200/400 V 50 Hz single phase transformer gave the following results:
OC test on the LV side: 200 V, 1A, 100 W
SC test with the LV side shorted: 15 V, 10A, 85W
Determine the parameters of the equivalent circuit and draw the equivalent circuit referred to LV-side.

OR

- 4 (a) Explain the construction of a magnetic core of a transformer
(b) A 10 KVA, 6600/220 V, 50 Hz transformer is rated at 2.5 V/turn of the winding coils. Assume the transformer to be ideal and calculate: (i) Step-up transformation ratio. (ii) Step-down transformation ratio. (iii) The total turns of high voltage and low voltage coils. (iv) The primary and secondary currents as a step-down transformer.

UNIT – III

- 5 (a) Explain the relationship between slip and rotor frequency.
(b) Explain the torque slip characteristics of an induction motor for different values of rotor resistances.

OR

- 6 Explain the procedure for evaluating of voltage regulation by synchronous impedance method

PART – B
(Electronics Engineering)

UNIT – I

- 7 Explain about Zener diode and its characteristics and also explain how it works as a voltage regulator.

OR

- 8 Discuss about Diode switching characteristics.

UNIT – II

- 9 (a) A transistor has $I_b = 100\mu\text{A}$ and $I_c = 2\text{mA}$. Find: (i) β of the transistor. (ii) α of the transistor. (iii) Emitter current I_e . (iv) If I_b changes by $+25\mu\text{A}$ and I_c changes by $+0.6\text{mA}$, find the new value of ' β '.
(b) Explain how a transistor can act as an amplifier

OR

- 10 (a) A FET has a drain current of 4mA. If $I_{DSS} = 8\text{mA}$ and $V_{GS\text{ off}} = -6\text{ V}$. Find values of V_{GS} and V_P .
(b) Define α_{dc} and β_{dc} of a transistor and derive the relation between them.

UNIT – III

- 11 Find out the 9's complement of following decimal numbers: (i) 459. (ii) 36. (iii) 1697.

OR

- 12 (a) Convert 3C, 104, 3A0 from hexadecimal to decimal
(b) Why digital circuits are more frequently constructed with NAND or NOR gates than AND and OR gates? Explain.
