Code: 13A99302 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations November/December 2016

ELECTRICAL & ELECTRONICS ENGINEERING

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Answer all questions

All questions carry equal marks

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PART – A

(Electrical Engineering)

UNIT – I

1 (a) Explain in detail the classification of DC generators.

(b) Derive the expression for torque of a DC motor.

OR

2 (a) With a neat sketch, explain the function of the various components of a 3-point starter.

(b) Derive the expression for induced emf in a DC generator.

UNIT – II

3 (a) State and prove the condition for maximum efficiency of a transformer.

(b) The readings obtained from open and short circuit tests on 10 kVA, 450/120 V 50 Hz transformer are: O.C Test: V = 120 V, I = 4.2 A, W = 80 W.
S.C Test: V = 9.65 V, I = 22.2 A, W = 120 W.
Compute the efficiency and voltage regulation at full load and 80% lagging p.f load.

OR

4 (a) What are the various losses occur in a transformer? Explain in detail.

(b) A single phase transformer has 500 turns in the primary and 1200 turns in the secondary. The cross sectional area of the core is 80 sq cm. If the primary winding is connected to a 50 Hz supply at 500 V, calculate (i) Peak flux density. (ii) Voltage induced in the secondary.

UNIT –III

5 (a) Explain the slip torque characteristics of 3-phase induction motor.

(b) A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate:
(i) The speed at which the magnetic field of the stator is rotating.
(ii) The speed of the rotor when the slip is 0.04.
(iii) The frequency of the rotor currents when the slip is 0.03.
(iv) The frequency of the rotor currents at standstill.

OR

6 Explain with a neat sketch, how the voltage regulation is determined by synchronous impedance method.

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PART – B
(Electronics Engineering)

UNIT – I

7 Explain the working principle of SCR with suitable diagrams.

OR

8 (a) Explain the formation of depletion region in an open circuited p-n junction with neat sketches.

(b) In a FWR circuit using an LC filter, L = 10 H, C = 100μF and RL = 500Ω. Calculate Idc, Vdc, ripple factor for an input of V_i = 30 sin(100)v.

UNIT – II

9 Why we call FET as a voltage controlled device? Draw the structure of an N-channel JFET and explain its principle of operation. Why is the name field effect used for the device?

OR

10 With necessary diagram explain the input and output characteristics of CE configuration.

UNIT –III

11 (a) Realize XOR gate using minimum number of NAND gates.

(b) Convert the following from octal to decimal and hexadecimal to decimal:

(i) 237 (ii) 24.6 (iii) 11.1 (iv) 12.3

OR

12 (a) $(16)_{10} = (20)_x$. Find x.

(b) Convert the numbers 11110, 1011 from binary to decimal.

(c) Given two numbers X = 1010100 and Y = 1000011, perform the subtraction X – Y and Y – X using 2's compliment.

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