Code No: 113AP

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, December-2014
ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, AME, PTE, CEE, MSNT)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART-A (25 Marks)

1.a) Derive the equation for equivalent resistance of number of resistors connected in parallel. [2M]
b) Why the PMMC instruments are not used for A.C. measurements. [3M]
c) Give the significance of back emf in a dc motor. [2M]
d) A 25kW, 250V dc shunt generator has armature and field resistances of 0.06 ohm and 100 ohm respectively. Determine the total armature power developed when working as a generator delivering 25kW output. [3M]
e) Define voltage regulation of transformer. [2M]
f) Draw the slip-torque characteristics of three phase induction motor. [3M]
g) What is the primary function of a rectifier filter? [2M]
h) Find the current, if any flowing in the circuit of Figure 1 which uses two oppositely connected ideal diodes in parallel. All resistances are in ohms. [3M]

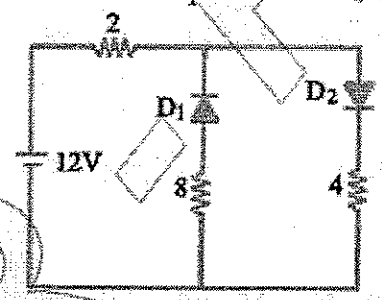

Figure: 1

i) What is the difference between CRO and CRT? [2M]
j) How frequency can be measured using CRO? [3M]

PART-B **(50 Marks)**

2.a) State necessary equations to convert a delta network into equivalent star network.
b) Explain any one type of MI instruments.
c) Calculate the resistance between terminals A-B in Figure 2.

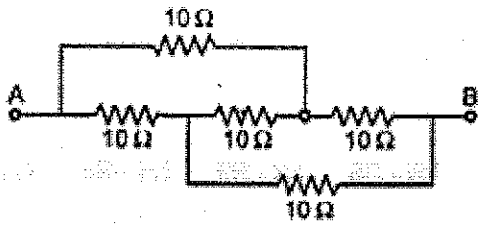

Figure: 2

OR

3.a) State and explain the Kirchhoff's laws with suitable example.

b) Explain deflecting torque, controlling torque and damping torque with reference to indicating instruments.

c) Calculate the current in 5Ω resistor shown in Figure 3

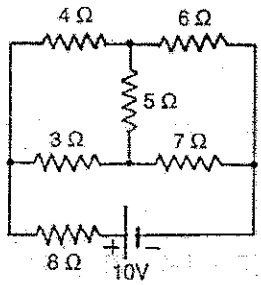

Figure: 3

4.a) Derive the induced e.m.f equation of a D.C. Generator.

b) An 8-pole, D.C generator has 500 armature conductors, and a useful flux of 0.05 Wb per pole. What will be the emf generated if it is lap-connected and runs at 1200 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave wound?

OR

5.a) Name the main parts of a D.C. Machine and state the function each part and name the material materials of which each part is made.

b) Derive an expression for the speed of a DC motor in terms of back emf and flux per pole.

c) A 250V DC shunt machine has line current of 80A. It has armature and field resistances of 0.1 ohms and 125 ohms respectively. Calculate the power developed in armature when running as a generator.

6.a) Draw the phasor diagram of transformer on load considering an inductive load and write the relevant expressions.

b) List out the various starting methods of a three phase induction motor.

c) A 440V, 200kVA, 3-phase star connected alternator has armature resistance of 0.02Ω and synchronous reactance of 0.08 Ω per phase. Calculate the induced emf on full load for 0.707 leading p.f.

OR

7.a) "Transformer is a constant flux device". Justify the statement.

b) A 600 HP three phase, 440V, 50Hz induction motor with 6 poles has rotor current frequency of 2Hz. Compute the operating slip and actual speed of the machine.

c) Explain the regulation of alternator by synchronous impedance method.

8.a) Explain the operation of half wave rectifier with neat sketch.

b) Explain the working principle of a PNP transistor.

c) For a p-n-p transistor in CE mode, $\beta = 100$. What is the value of α? If $I_{co} = 10\mu A$, what is the collector current for an emitter current of 2 mA?

OR

9.a) Draw V-I characteristics of a PN junction diode.

b) Derive an expression for efficiency of a half-wave rectifier.

c) If a transistor with $\alpha = 0.96$ and emitter to base resistance 80Ω is placed in common emitter configuration, find the gains of A_i, A_v, and A_P?

10.a) How can the phase difference between two AC voltages be measured by a CRO?

b) Write a short note on voltage and current measurement using CRO.

OR

11.a) Draw a neat block diagram of CRO and explain the function of each block.

b) Explain about electrostatic and Magnetic deflection in CRO.

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