

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)

END SEMESTER EXAMINATION December/ January 2017/2018

Programme: B.Tech (Marine Engineering)

Semester: 1st Semester

Subject Name: Basic Electrical And Electronics Engineering

Subject Code: UG11T3104/

UG11T2104/ UG11T1104

Date: 12.12.2017

Maximum Marks: 100

Time: 03 Hrs

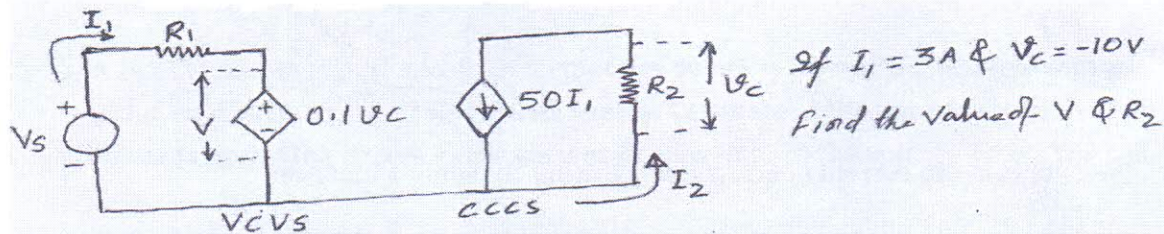
Pass Marks : 50

PART – A

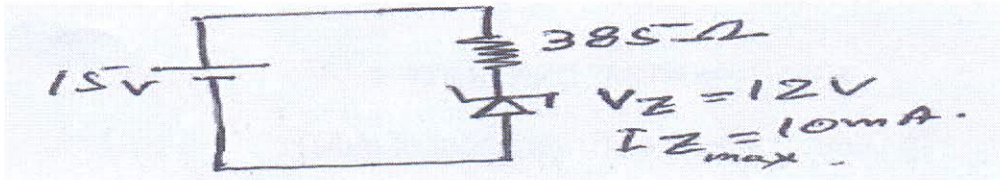
10x 3 Marks= 30 Marks

(All questions are compulsory)

Q 1)



- State Maximum power transfer theorem. For what type of circuit analysis this Theorem is used?
- What is power factor? Why we need to maintain the power factor high in electrical installation?
- In a balanced 3phase star configuration, establish the relationship between Line Voltage and phase voltage
- A Solenoid is wound with a coil of 100 turns. The coil is of length 50 cms. And is Carrying a current of 2 Amps. Determine the magnetic field strength at the line of the solenoid.
- A 230 V single phase energy meter has a constant load current of 20 A at unity power factor. If the meter disc makes 2300 revolutions during 2hrs, calculate the meter constant.
- In an electrical installation what is the significance of Earthing?
- The Zener diode shown is an ideal one. Find weather it is correctly biased or not



i) What is Extrinsic semiconductor?

J) Draw a basic diagram of a common emitter configuration transistor showing biasing and the current direction. Establish the relation $\beta = \alpha / 1 - \alpha$

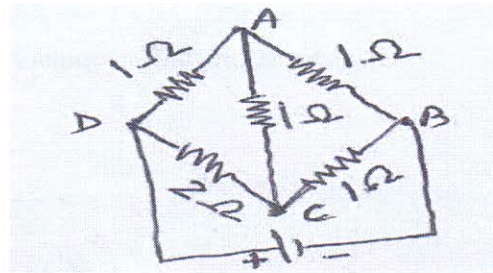
PART - B

(Answer any 5 of the following)

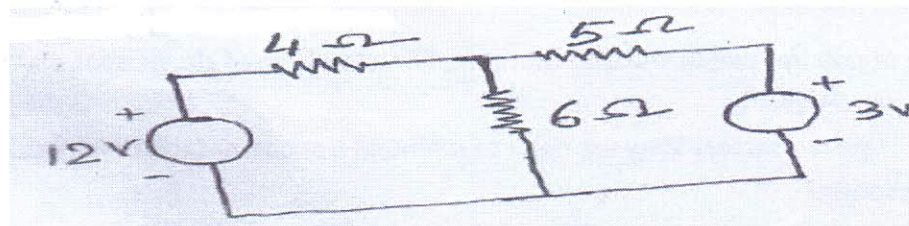
5 x 14 Marks = 70 Marks

Q/2 a) State Kirchhoff's laws.

b) A bridge network ABCD has arms AB, BC, CD and DA of resistances 1Ω , 1Ω , 2Ω and 1Ω respectively. If the detector between AC has a resistance of 1Ω , determine by Star / Delta transformation, the network resistance as viewed from the Battery terminals



c) Find the current in 6Ω resistance using Thevenin's theorem



(4 + 5 + 5)

Q/3 a) A coil of resistance 30Ω and inductance 0.6 H is switched on to a 240 V supply. (a) Calculate the rate of change of current (i) at the instant of closing of the switch when $t = 0$ and (ii) at time $t = 2(L/R)$; (b) the magnitude of the final steady state current (7)

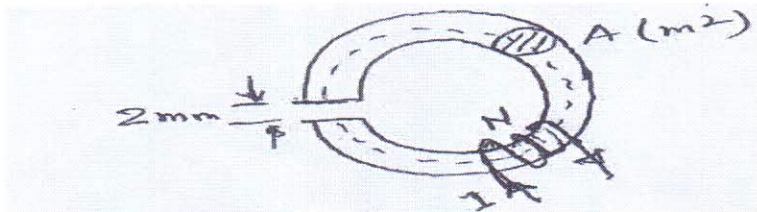
b) i) What is Sulphation in cells (battery)?

ii) A 6 – cell, 12 volt battery is to be charged at a constant rate of 10 ampere from a 24 volt d.c. supply. If the EMF of each cell at the beginning and end of charging is 1.9 V and 2.4 V, what should be the value of maximum resistance to be connected in series with the battery. Resistance of the battery is negligible
(3+4)

Q) 4 a) What is a magnetic circuit?. Why a core is used in a magnetic circuit? Draw a simple magnetic circuit and in your circuit show Leakage flux, useful flux and fringing.

What is leakage coefficient? (1 + 2 + 3 + 1)

b) An Iron ring of mean length 30 cm, has an air gap of 2 mm and a winding of 200 Turns. If the permeability of the Iron is 300, when a current of 1 A flows through the coil, find the flux density. Draw the electrical analogue circuit for the magnetic circuit.



(7)

Q/5 a) A coil of resistance 20Ω and an inductance of 60 mH is connected in series with a $130\mu\text{F}$ capacitor across a 230 V, 50 Hz supply. Calculate a) the impedance b) the Power factor of the circuit. c) the current flowing in it. d) the voltage across the coil.

(7)

b) What is a balanced 3 phase system? You have two watt meters and you are required to measure the power consumed by a three phase motor. Show the arrangement and justify your measurement.

(2 + 5)

Q/6 a) The four impedances of an a.c. bridge are $Z_1 = 300\Omega \angle 40^\circ$, $Z_2 = 200\Omega \angle 40^\circ$, $Z_3 = 400\Omega \angle 30^\circ$ and $Z_4 = 600\Omega \angle 50^\circ$. Find out weather the bridge is balanced Under these conditions or not. Justify your judgement

(4)

b) i) You need to measure insulation resistance of a coil, which is of the order of few $\text{M}\Omega$. Can you measure this resistance with a Multi meter? Justify your answer.

ii) You have a PPMC type of instrument, which gives full scale deflection at 100mV p.d. and 50 mA current. How will you use it as an a) Ammeter of 0 – 60 range and b) Voltmeter of range 0-300 V. Draw the circuit for each case. (5 + 5)

- Q/7 a)** How the Diode rectify a.c. signals? Draw a diagram of a bridge rectifier (using 4 Diodes) to convert single phase a.c. supply into d.c. supply. Label your circuit showing the direction of current through the load. What is the significance of filters in the rectifier circuit. (2 + 4 + 1)
- b)** Differentiate between avalanche break down and zener breakdown. (7)
- Q/8 a)** What is a transistor? Draw a circuit diagram and explain the working of a NPN Transistor. (1 + 6)
- b)** For the common emitter NPN silicon transistor circuit shown in the figure below, determine the Q point and estimate I_{CQ} and V_{CEQ} when $V_{CC}=12\text{ V}$, $V_{BB} = 6\text{V}$, $R_C=150\ \Omega$, and $R_B = 88\ \text{K}\Omega$. (7)

