

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)  
**End Semester Examinations December 2018**  
**B. Tech (Marine Engineering)**  
**Semester: I**  
**Basic Electrical and Electronics Engineering (UG11T3104)**

Date: 04.01.2019  
Time: 3 Hrs

Maximum Marks: 100  
Pass Marks: 50

**PART – A**

**(All questions are compulsory) (10 x 3 = 30 Marks)**

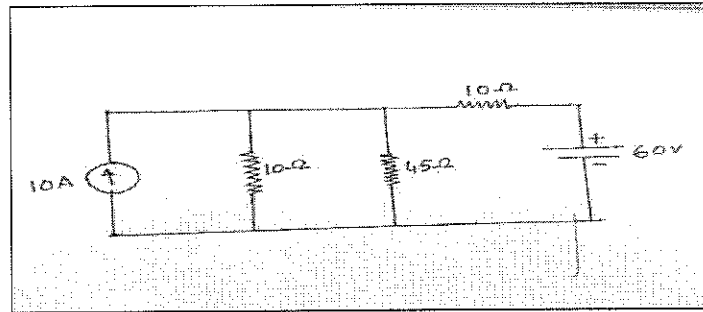
1. (a). An independent voltage source has an open circuit voltage of 24 V and an internal resistance of  $0.75 \Omega$ . Transform the voltage source into an equivalent current source and draw its equivalent circuit when it supplies a load of  $10 \Omega$ .
- (b). Find the frequency and form factor of a voltage source  $V = 200 \sin 310t$ .
- (c). Differentiate the resonance effect in a Series and a Parallel circuit.
- (d). A wire consists of 06 turns and carries a current of 3A. Calculate the magneto motive Force and the reluctance of the circuit, if the flux is  $0.089 \text{ Wb}$ .
- (e). Why is a controlling torque necessary in an analog indicating instrument? What would happen in the absence of a controlling torque?
- (f). The four impedances of an a.c. bridge are  $Z_1 = 200 \Omega \angle 30^\circ$ ,  $Z_2 = 400 \Omega \angle 40^\circ$ ,  $Z_3 = 500 \Omega \angle 50^\circ$ ,  $Z_4 = 250 \Omega \angle 20^\circ$ . Find out whether the bridge is balanced under these conditions or not. Justify your answer.
- (g). Draw an arrangement for a stair case lighting in a house, which can be switched ON or OFF from both the end of the stair case (Two way switch).
- (h). What is doping in a Semiconductor? Why do semiconductors require doping?
- (i). What is the Q point of a transistor?
- (j). Differentiate between Shunt voltage regulator and Series voltage regulator.

**PART - B**

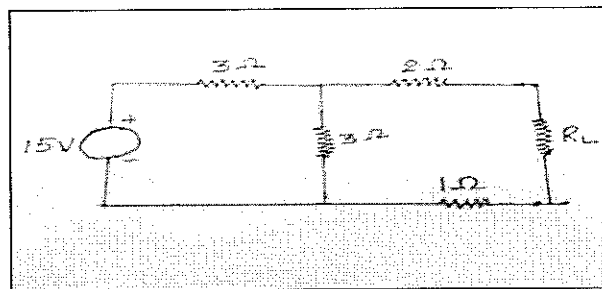
Answer any five of the following seven questions

(5 x 14 = 70 Marks)

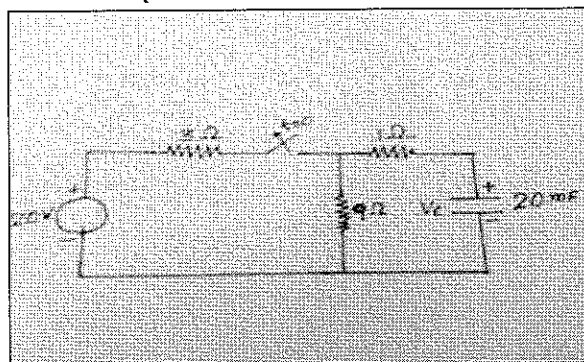
2. (a). In the given circuit find whether the two sources i.e. Current source of 10A and Voltage source of 60 V , is consuming power or delivering power?. Use Nodal analysis method for the justification. (7)



- 2 (b). In the network shown below, find the value of  $R_L$  such that maximum possible power will be transferred to  $R_L$ . Also find the value of maximum power consumed by the Load resistance  $R_L$  and the power supplied by the source under these conditions. (7)

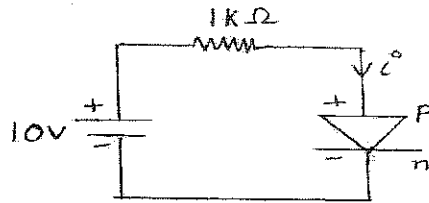


3. (a). As shown in the circuit below, initially the switch was closed for long time ( $t = \infty$ ) At  $t = 0$ , the switch was opened. Find the Capacitor voltage  $V_C(t)$  for  $t > 0$  (after the Switch is opened) (7)



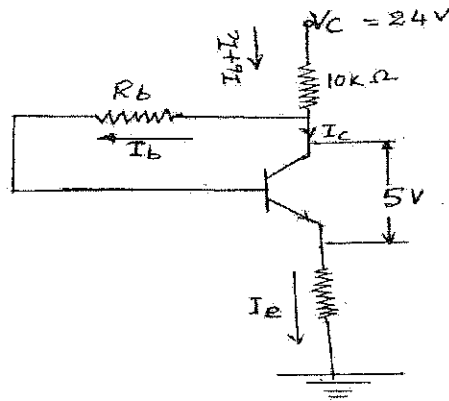
3. (b). In a Lead-acid battery "Gassing is an indication of over-charging"  
Justify the statement. Name the method used for continuous  
Charging of the bank of batteries on board ships, without the  
Batteries getting over charged or under charged. (7)
4. (a). A current of 5A flows through a non-inductive resistance in series  
With a Choking coil, when supplied at 250V, 50Hz. If the voltage  
Across the resistance is 125 V and across the choke coil is 200 V,  
Calculate (a) Impedance (b) reactance and resistance of the coil (c)  
The power absorbed by the coil.(d) Total power.  
Draw the vector diagram. (7)
- (b). We have a 3-phase 4 wire system for distribution of power. Under  
what circumstances we can remove the 4<sup>th</sup> wire to make the system a  
3-phase 3 wire system? Justify your answer. (7)
5. (a). State Faraday's laws of electromagnetic induction. Explain briefly the  
different types losses in magnetic circuit. (7)
- (b). Two identical 600 turn coils A and B, lie in parallel planes. A current  
changing at the rate of 1500 A/Sec in coil A induces an emf of 11.25 V  
in coil B. Calculate the mutual inductance of the Arrangement. If the  
self-inductance of each coil is 15 mH, calculate the flux produced in  
coil A per ampere and the percentage of this flux which links the turns  
of coil B. (7)
6. (a). With a neat sketch explain the working of a PMMC (permanent  
magnet moving coil) type ammeter. Can this instrument be used for  
measuring alternating current? (7)
- (b). A moving coil instrument has a resistance of 10  $\Omega$  and gives  
Full-scale deflection when carrying a current of 50mA. Show how it  
Can be used to measure voltage up to 750V and current up to  
100A. (7)
7. (a). How do diode rectify a.c. signal? Draw a diagram of a bridge  
Rectifier (using 4 diodes) to convert single phase a.c. supply into  
d.c. supply. In your diagram show the current flow direction through  
the load, the location of the filter and the wave form at every stage  
(7)

- (b). The i-v characteristics of the diode in the circuit given below are (7)  
 $i = 0$  at  $v < 0.7V$   
 $i = (v - 0.7)/ 500 A$ , at  $V > 0.7V$   
 Find the value of current in the circuit



8. (a). What is a transistor? Draw a circuit diagram and explain the working of a NPN transistor. Show the current flow direction in your diagram. (7)
- (b). Define  $\alpha$  and  $\beta$  parameters of a transistor. A Germanium transistor with  $\beta = 45$  is biased as shown below Calculate the value of  $R_b$  (base resistance) (7)

CIRCUIT DIAGRAM.



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