

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Govt. of India)

May/June 2015 End Semester Examinations

**SEMESTER – I, B.TECH ( MARINE ENGINEERING)**

**BASIC ELECTRICAL & ELECTRONICS (T 2104 / T 1104)**

Date:16.06.2015

Time:-3 Hrs

Max.Marks:100

Pass Marks:50

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**PART – A**  
(Compulsory Questions)

(3 x10 = 30 Marks)

1. a) What is the significance of grouping of cells?
- b) A coil of 1500 turns carries a current of 10 A, establishing a flux of 0.5 mWb.  
Find the Inductance of the coil.
- c) An a.c. circuit consists of a pure resistance of  $20\Omega$  is connected across 220V (rms),  
50 Hz a.c. supply. Calculate:  
(I) The current      (II) The power consumed      (III) The equation for the voltage.
- d) Why is damping torque necessary in a sensitive analog indicating instrument? What  
would happen in the absence of damping torque?
- e) What is a transducer? Give three examples
- f) As regard electrical cables, what is an insulator? Why plastic is not used as an insulator  
on board?
- g) Why P-N junction Diode does not work when connected in reverse biased mode?
- h) What is the special feature of a Zener diode? Draw Zener diode characteristic curve  
and label it.
- i) The reverse saturation current of an NPN transistor in common-base circuit is  $12.5 \mu\text{A}$ .  
For an emitter current of 2mA, collector Current is 1.97mA.  
Determine the current gain and base current.
- j) With respect to a junction transistor, what is current gain?

**PART – B**  
**(Answer any five of the following)**

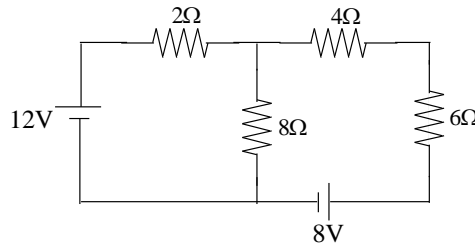
**(5 x14 = 70 Marks)**

2. a) How will you Thevenize a given circuit? Write step wise.

b) Using Kirchoff's laws find

(i) The current in  $6\Omega$  resistance

(ii) Voltage drop across  $8\Omega$  resistance



**(6+8)**

3. a) What is the purpose of metallic core in an electrical device? Draw a simple magnetic circuit and show leakage flux, useful flux and fringing. What is Hopkinson's leakage coefficient? How can you minimize the leakage flux? **(1+3+2+1)**

b) An air cored solenoid has 400 turns, its length is 30 cm and it has a cross-sectional area of  $5\text{ cm}^2$ . Calculate its self-inductance. **(7)**

4. a) Prove that in a  $3\Phi$  Star connected balanced system the algebraic sum of the three phase e.m.f is zero i.e.,  $e_1 + e_2 + e_3 = 0$

b) A coil of resistance  $20\Omega$  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: (i) The Impedance

(ii) The power factor of the circuit

(iii) The current flowing in it

(iv) Voltage across the inductance of the coil

(v) The voltage across the capacitor.

**(4+10)**

5. a) With a neat sketch explain the construction and working of a moving iron type ammeter. Can we use eddy current damping for this type of instrument? Justify your answer. **(5+2)**

b) How will you use a P.M.M.C. instrument which gives full scale deflection at 50 mV and 10 mA current, as **(7)**

(i) Ammeter 0-10A range

(ii) As voltmeter 0-250 V range.

6. a) A dynamometer type wattmeter with its voltage coil connected across the load side of the instrument, reads 250 watts. If the Load voltage be 200 v, what power is being taken by load? The voltage coil branch has a resistance of  $2,000\Omega$ .  
Also show the connection. (7)
- b) The arms of an A.C. Maxwell bridge are arranged as follows: AB is a non-inductive resistance of  $1000\ \Omega$  in parallel with a Capacitor of capacitance  $0.3\ \mu\text{F}$ , BC is a non-inductive resistance of  $500\ \Omega$ , CD is inductive impedance (unknown) and arm DA is a non-inductive resistance of  $800\ \Omega$ . If balance is obtained under these conditions, find the value of the resistance and the inductance of the branch CD. (7)
7. (i) What is Photo electric effect?
- (ii) Write short note on Thermionic emission and their applications.
- (iii) "When a P-N junction is formed, diffusion current causes barrier potential"  
Justify the statement with the help of labeled sketch. (4+4+6)
8. a) Enumerate the conditions for proper working of a Zener diode? Draw a circuit diagram suitable for its proper functioning give three applications of a Zener diode
- b) What is a rectifier? How many minimum numbers of diode you will require for full wave rectification in single phase circuit? Draw one such circuit, label it and explain its working. In your circuit include a filter. What is the role of the filter in the circuit? (6+8)
9. What is a transistor? What are the three modes in which the transistors are operated? Draw the circuits. Explain with a simple Circuit how a NPN transistor works. How a transistor amplifies current? (1+3+6+4)

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