

INDIAN MARITIME UNIVERSITY

(A Central University, Govt. of India)

End Semester Examinations- Dec 2019/Jan 2020

B.Tech (Marine Engineering)

Semester-I

UG11T1104/2104 – Basic Electrical and Electronics Engineering

Date: 17.12.2019

Maximum Marks: 70

Time: 3 Hrs

Pass Marks: 35

(PART- A)

(Question number 1 is compulsory) (10×2=20 Marks)

1.

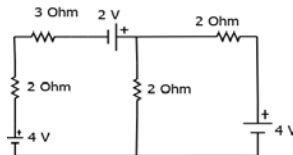
- State and Explain Kirchoff's voltage law.
- Find the average value and rms value of a voltage source $v=350 \sin 100\pi t$.
- An R-L-C series circuit consists of a resistance of 1000Ω , an inductance of 100 mH and a capacitance of $10 \mu\text{F}$. If a voltage of 100 V is applied across the combination, find the resonance frequency and Q-factor of the circuit.
- What do you understand by B-H curve characteristics?
- What is damping torque in analog instruments?
- State the balance condition in Maxwell's inductance-inductance AC Bridge?
- Selection of type of the wiring in electrical installation depends on which factors?
- Define ripple factor.
- Define α and β of a transistor?
- What is series regulator? Draw circuit diagram of series regulator.

PART-B

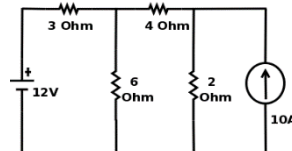
Answer any five of the following seven questions

(5×10=50 Marks)

- 2.a) Using node voltage method, find current in 3Ω resistance for the network given below. (5 marks)



- 2.b) Use Thevenin's theorem to calculate current flowing through 4Ω resistor. (5marks)

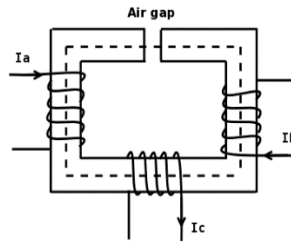


- 3.a) Derive an expression of transients of current in R-L series circuit when DC voltage V is suddenly applied to the circuit. (5 marks)
- 3.b) Explain working of lead acid battery. (5 marks)

- 4.a) A voltage $e(t) = 100 \sin 314t$ is applied to a series circuit consisting of 10Ω resistance, 0.0318H inductance and a capacitance of $63.6 \mu\text{F}$, calculate
1. Expression for current i ,
 2. Phase angle between voltage & current
 3. Power factor
 4. Active power consumed. (5 marks)

- 4.b) Derive the relationship between phase voltage and line voltage in a star connected three phase system with the help of phasor diagram and a circuit diagram. (5 marks)

- 5.a) A rectangular iron core is shown below has a mean length of magnetic path of 100 cm , cross-section of $(2\text{ cm} \times 2\text{ cm})$, relative permeability of 1400 and an air gap of 5 mm cut in the core. The three coils carried by the core have number of turns $N_a = 335$, $N_b = 600$ and $N_c = 600$ and the respective currents are 1.6 A , 4 A and 3 A . The directions of the currents are as shown. Find the flux in the air-gap. (5 marks)



- 5.b) Derive the expression for inductances connected in series and inductances connected in parallel. (5 marks)

- 6.a) With a neat sketch explain the working of a PMMC type ammeter. Can this instrument be used for measuring alternating current? Justify your answer (5 marks)

- 6.b) A galvanometer resistance 100Ω has 100 divisions. When a potential difference of 20 mV is applied to its terminal, it is deflected by 10 divisions. How can it be converted into a voltmeter to read 100 volts? (5 marks)

- 7.a) Explain the forward and reverse characteristics of a diode. (5 marks)

- 7.b) A half-wave rectifier using silicon diode has a secondary emf of 14.14 V (rms) with a resistance of 0.2Ω . The diode has a forward resistance of 0.05Ω and a threshold voltage of 0.7 V . If load resistance is 10Ω , determine,
- i. Dc load current
 - ii. Dc load voltage
 - iii. Voltage regulation
 - iv. Efficiency (5 marks)

- 8.a) What is a transistor? Explain input and output characteristics of a NPN transistor in a common base configuration. (5 marks)

- 8.b) How will you use transistor as a switch? (5 marks)