

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)  
**END SEMESTER EXAMINATIONS- JUNE 2019**  
**B. Sc. (Nautical Science)**  
SEMESTER-II  
**NAUTICAL PHYSICS- PAPER-IV (UG21T2206)**

Date:05-07-2019

Max Marks: 70

Time:3Hrs

Pass Marks: 35

**NOTE: Answer any SEVEN questions from the following questions.**  
**All questions carry equal marks. (7X10=70)**

- Q1.a)** Derive an expression for efficiency of a full wave bridge rectifier.(5)
- b)**A half wave rectifier is used to supply 50V dc to a resistive load of 800  $\Omega$ . The diode has a resistance of 25 $\Omega$ . Calculate the required ac voltage.  
(5)
- Q2.a)** What is a zener diode? Explain how zener diode maintains constant voltage across the load. (5)
- b)** A 10V zener diode is used to regulate the voltage across a variable load resistor. The input voltage varies between 13V and 16V and the load current varies between 10 and 85mA. The minimum zener current is 15mA. Calculate the values of series resistance  $R_s$  and the resistance of zener diode. (5)
- Q3.a)** Draw common emitter circuit of pnp transistor. State and explain the output characteristics. (5)
- b)** A transistor has an  $\alpha = 0.98$  and a collector leakage current  $I_{CO}$  of 1 $\mu$ A. Calculate the collector current and base current when  $I_E = 1$ mA. (5)
- Q4.a)** Prove that  $I_E = I_B (\beta + 1)$ . (5)
- b)** Discuss photoelectric cell. (5)
- Q5.a)** What is a thermistor? Discuss its application as a heat sensor. (5)
- b)** What are transducers? What are their applications? (5)
- Q6.a)** Explain the working of CE amplifier with neat circuit diagram. Derive an expression for current gain. (5)
- b)** Calculate the operating frequency and feedback fraction for a Hartley Oscillator with values,  $L_1 = 1000\mu$ H,  $L_2 = 100\mu$ H,  $C = 20\mu$ F, and  $M = 20\mu$ H. (5)

**Q7.** Explain principle, construction and working of a cathode ray oscilloscope (CRO) with neat diagram. (10)

**Q8.a)** Define accuracy and precision with example. (5)

**b)** What are the different methods for measuring pressure? Explain any one method in detail. (5)

**Q9.** Write note on any two of the following: (5 x 2 = 10)

- a) Capacitor Filter
- b) Light Emitting Diode (LED)
- c) Venturitube