Indian Maritime University

(A Central Uni5versity, Govt. of India)

End Semester Examinations – June 2025

Programme Name: B Sc (NS)

Semester: II

Subject Code: UG21T6202

Subject Name: Nautical Physics and Electronics

Date: 05.06.2025	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.

(ii) Section A & B compulsory, Attempt any five questions out of seven questions from section C.

(iii) Non- Programmable Scientific non programmable calculators are allowed.

Section A (10 x 1 mark = 10 marks)

Answer all questions Choose the correct answer.

1. Semiconductors are _____ at absolute zero temperature.
   A. conductors B. insulators C. Superconductors D. None of these

2. What is the accurate phase shift in CE amplifier?
   A. 45° B. 120° C. 180° D. 60°

3. Which motor is used in elevators?
   A. Shunt motor B. Series motor C. Differential compound motor
   D. Cumulative compound motor

4. The potential barrier of a pn junction is due to
   A. Fixed acceptor and donor ions on either side of the junction
   B. minority carriers on either side
   C. majority carriers on either side
   D. both majority and minority carriers on either side

5. Which amplifier of the following has high linearity and lowest distortion?
   A. Class A B. Class B C. Class C D. Class AB

6. What should be the biasing of the LED so that it works?
   A. Forward Bias B. Reverse Bias
   C. First forward and then reverse bias D. No biasing required

7. _____ describes the current flow between the two junctions formed by joining two different materials.

A. Seebeck effect B. Thomson effect C. Peltier effect

D. None of the mentioned

8. Which configuration of the transistor amplifier is used for the Hartley oscillator?

A. CE amplifier B. CC amplifier C. CB amplifier D. combination of CE and CB amplifier

9. A universal logic gate is one which can be used to generate any logic function. Which of the following is a universal logic gate?

A. OR B. AND C. XOR D. NAND

10. The given Boolean expression is

$$Y = AB' + BA'$$

If A = 1 and B = 1, then find, Y =

A. 1 B. 0 C. either 0 or 1 D. none of the above

Section B (02 x 05 = 10 marks)
Answer all five question

11. Define knee voltage.

12. State the principle of a generator.

13. What is mutual induction? Give its expression.

14. Draw the truth table and the symbol of OR gate.

15. What is the current gain of a transistor amplifier circuit if I_1 = 10mA, I_2 = 20mA, V_1= 25V and V_2 = 15V?

Section C (05 x 10 = 50 marks)

16. a) Discuss the behaviour of a PN Junction under forward and reverse biasing with volt-ampere characteristics. **(7 Marks)**

b) How does Zener diode work in reverse bias? Also mention its main application. **(3 Marks)**

17. a) Describe the working of Light dependent resistor with neat sketch. **(5 Marks)**

b) State heating effect of electric current and brief any two applications. **(5 Marks)**

18 Explain Series type, Shunt type and Compound type dc motor. **(10 Marks)**

19. a) State Faradays Laws of electromagnetic induction. **(4 Marks)**

b) An emf of 25 V is induced in a coil of 300 turns when the flux linking with it changes by 12 mWb. Find the time, in milliseconds, in which the flux makes change. **(3 Marks)**

c) Determine mutual inductance between two coils when current changing at 50 A/s in one coil induces an emf of 80 mV in other coil. **(3 Marks)**

20. a) Explain the operation of transistor as an amplifier in CE arrangement with neat sketch. **(7 Marks)**

b) Draw the circuit diagram of push – pull amplifier. **(3 Marks)**

21. a) Explain transistor RC coupled amplifier with special reference to frequency response, advantages and applications. **(7 Marks)**

b) An amplifier has a voltage gain of 500 without feedback. If a negative feedback is applied, the gain reduced to 100. Calculate the fraction of the output fed back. If due to ageing of components, the gain without feedback falls by 20%, calculate the percentage fall in gain with feedback. **(3 Marks)**

22. a) With a neat diagram, explain the action of colpitt's oscillator with frequency of oscillation and feedback fraction. **(7 Marks)**

b) Simplify the Boolean expression $Y = (\bar{A} + B)(A + B)$. **(3 Marks)**

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