Indian Maritime University

(A Cent3ral University, Govt of India)

End Semester Examinations – December 2024

Programme Name: B Tech (Marine Engineering)

Semester: I

Subject Code: UG11T5106

Subject Name: Basic Electronics

Date: 27.12.2024	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.
(ii) Options, if any, are specified in respective section.

Section A

1. Zener diode is designed to specifically work in which region without getting damaged?
a) Active region
b) Breakdown region
c) Forward bias
d) Reverse bias

2. Which of the following statement is true about FET?
a) It has high output impedance
b) It has high input impedance
c) It has low input impedance
d) It does not offer any resistance

3. Which of the following terminals does not belong to the MOSFET?

(a) Drain

(b) Gate

(c) Base

(d) Source

4. The voltage gain of the amplifier is 8 and the current gain is 7. The power gain of the amplifier is
a) 56 dB
b) 17.481 dB
c) 34.963 dB
d) 1 dB

5. Which of the following statements is true about De Morgan's theorem?

a) It states that (A+B)' = A' + B'
b) It states that (AB)' = A' * B'
c) It states that (A'B')' = AB
It states that (A+B)' = A'B'

6. The gate which is used to reverse the output obtained is _____
a) NOR
b) NAND
c) EXOR
d) NOT

7.If a capacitor is placed in the feedback path of the op-amp circuit then the circuit act as

a) Integrator

b) Subtractor

c) Adder

d) Divider

8. The expression of an EXOR gate is _____
a) A'B+AB'
b) AB+A'B'
c) A+A.B
d) A'+B'

9. What happens when the amplitude of the modulating signal is greater than the amplitude of the carrier?
a) Decay
b) Distortion
c) Amplification
d) Attenuation

10. Which electromagnetic wave is commonly used in radar systems?
a) Ultrasonic
b) Ultraviolet
c) Infrared
d) Radio

Section B

Five Questions of 02 Marks each

11. What are universal gates? Why are they called so?
12. A transistor has a=0.98. If the emitter current of a transistor is 1mA, determine the base current and gain factor β.
13. Write any two advantages of JFET over BJT
14. Write the ideal characteristics of an opamp
15. What are the types of analog modulation?

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16. (a) Explain working of diode as positive clamper. (05 marks)
(b) Design a 1-bit magnitude comparator using logic gates. Draw the logic circuit diagram.(5 marks)

17. (a) An AM wave equation is given as, $v=5(1+0.6 \sin 150t) \sin (314 \times 10^4 t)$ Volts.What are the minimum and maximum amplitudes of AM Wave? What are the amplitudes and frequencies of message signal, RF carrier? (05 marks)

(b) Draw the typical frequency response curve of a CE amplifier. How do you find out the bandwidth of amplifier? (05 marks)

18(a)What is a transistor? Draw input and output characteristics of a NPN transistor in a common base configuration. (05 marks)
(b) What is rectifier? Draw diagram and explain working of Bridge type full wave rectifier? (05 marks)

19. (a) Draw and explain the V-I characteristics of PN Junction Diode.(5 marks)
(b) Draw the block diagram of AM super heterodyne radio receiver and state the function of each block (05 marks)

20.(a) Reduce the Boolean expression: A = XY + X(Y+Z) + Y(Y+Z) (05 marks)

(b) In figure below, it is shown that the Si Transistor with current gain $\beta=100$ is biased by Fixed Bias Method. Find I_B, R_B and R_C. (Given $V_{BE}=0.7$) (05 Marks)

21. (a) An AC supply of 230 V is applied to a half-wave rectifier circuit through a transformer of turn ratio 10: 1. Find (i) the output DC voltage and (ii) the peak inverse voltage. Assume the diode to be ideal. (05 marks)
(b) Why stabilization of transistor is required. Explain the different stability factors. (05 marks)

22.(a) State and prove DE Morgan's theorem (05 marks)
(b)Draw and explain block diagram of RADAR system (05 marks)