Indian Maritime University

(A Central University, Govt of India)

Mar/Apr'26 SE

Programme Name: B Tech Marine Engineering

Semester: First Semester

Subject Code: UG11T5106

Subject Name: Basic Electronics

Date: 10.03.2026	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

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. Major part of the current in an intrinsic semiconductor is due to
   a.Conduction band electrons b.Valence band electrons
   c.Holes in the valence band d.Thermally generated electrons

2. A depletion layer consists of
   a.electrons b. protons c.mobile ions d. immobile ions

3. A zener diode
   a. has a high forward voltage rating b. has a sharp breakdown at low reverse voltage
   c. is useful as an amplifier d. has a negative resistance

4. When a n-p-n transistor is used as an amplifier then?
   a. the electrons flow from emitter to collector b. the holes flow from emitter to collector c. the electrons flow from collector to emitter d. the electrons flow from battery to emitter

5. Voltage-divider bias provides
   a. an unstable Q point b. a stable Q point c. a Q point that easily varies with changes in the transistor's current gain d.a Q point that is stable and easily varies with changes in the transistor's current gain

6. What is the phase-shift between input and output voltages of CE amplifier?
   a. 90° b. 120° c. 180° d. 270

7. Find the input voltage of an ideal op-amp. It's one of the inputs and output voltages

are 2v and 12v. (Gain=3)
a. 8v b. 4v c. -4v d. -2v

8. What is the hexadecimal equivalent of the binary number 110101
a. 2B b. 38 c. 6A d. 35

9. If a radio receiver amplifies all the signal frequencies equally well, it is said to have high
a. sensitivity b. selectivity c. distortion d. fidelity

10. The major advantage of FM over AM is
a. reception is less noisy b. higher carrier frequency c. smaller bandwidth
d. small frequency deviation

Section B

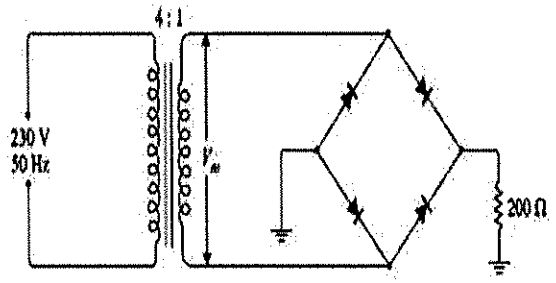
Five Questions of 02 Marks each

11. What is peak inverse voltage?
12. Why do we choose Q point at the centre of the load line?
13. State De Morgan's theorem.
14. What is Virtual ground property of an OP-AMP
15. Define modulation index of a AM wave

Section C

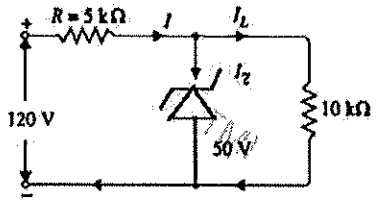
Seven Questions of 10 Marks each of which any 05 questions to be answered.

16.(a) Explain V-I characteristics of Zener diode. (5)
(b) In the bridge type circuit shown below the diodes are assumed to be ideal. Find (i) d.c. output voltage (ii) peak inverse voltage (iii) output frequency. Assume primary to secondary turns to be 4. (5)



17.(a) Explain DC Load Line of a transistor (6)
(b) What is transistor biasing and why is it needed? (4)

18.(a) Discuss the behaviour of a pn junction under forward and reverse biasing. (5)
(b) For the circuit shown below find : (i) the output voltage (ii) the voltage drop across series resistance (iii) the current through zener diode. (5)



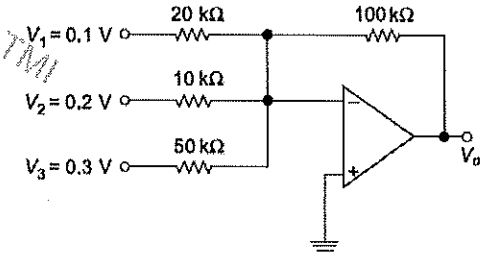
19.(a) Minimize the following 4-variable Boolean expression in SOP form using K-map. f(A,B,C,D)=Σm(0,1,4,5,6,10,11,13)+d(2,3) (5)

(b) Explain the construction and working of uni junction transistor (5)

20.(a) Simplify the Boolean function F = A(A'+B)+(B+AA)(A+B') (4)

(b) With neat diagram explain the application of op-amp as (6)
(i) Voltage follower (ii) Subtractor

21.(a) Determine V_0 for the circuit shown in Fig. (4)



21.(b) Explain the working principle of RADAR. (6)

22. A frequency modulated voltage wave is given by the equation : (10)
e = 12 cos (6 × 10^8t + 5 sin 1250 t).
Find (i) carrier frequency (ii) signal frequency (iii) modulation index (iv) maximum frequency deviation (v) power dissipated by the FM wave in 10-ohm resistor.