

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2023

Programme Name: B Sc (NS)

Semester: I

Subject Code: UG21T5104

Subject Name: Electronics

Date: 12.06.2023

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.
- (iii) Scientific Calculator is permitted.
- (iv) Norrie's Table, Nautical Almanac, Hindship Hyd. Particulars, Weather coding booklet, Tide Tables, permitted as per the subject concerned.
- (v) World Map, Tidal curve, Radar Plotting sheets, Charts, Illumination range curve chart will be supplied by the Examination Centre.

Section A

Ten MCQs/Fill in the Blanks of One Mark each – Choose the correct answer.
Objective Questions (MCQ/True or False/Fill in the blanks/Match the following)
10 X 1 = 10 Marks

1. An 8085 microprocessor can address a memory upto _____ kB.
(a) 64 (b) 32 (c) 128 (d) 256

2. The minimum number of select lines required for 512:1 multiplexer are
(a) 7 (b) 8 (c) 9 (d) 10

3. Which among the following hardware interrupt has the lowest priority?
(a) TRAP (b) INTR (c) RST 7.5 (d) RST 5.5

4. The minimum number of NAND gates required to design an AND gate.

- (a) 4 (b) 3 (c) 2 (d) 1

5. Why doping is required?

(a) To decrease the conductivity of a pure or intrinsic semiconductor.

(b) To increase the conductivity of a pure or intrinsic semiconductor.

(c) To engineer a different form of semiconductor material with higher level of conductivity.

(d) Both (b) and (c)

6. One of De-Morgan's theorems states that $\overline{X + Y} = \bar{X} \cdot \bar{Y}$. Simply stated, this means that logically there is no difference between:

(a) a NOR and an AND gate with inverted inputs

(b) a NAND and an OR gate with inverted inputs

(c) an AND and a NOR gate with inverted inputs

(d) a NOR and a NAND gate with inverted inputs

7. If the frequency of a wave is 20 Hz, the time period is _____.

- (a) 0.2 sec (b) 0.05 sec (c) 2.0 sec (d) 20.0 sec

8. The total number of 16 bits registers present in an 8085 microprocessor.

- (a) 1 (b) 2 (c) 3 (d) None

9. "IRNSS" is the system of satellites used for navigation which is designed and maintained by Indian Space Research Organization (ISRO). The full form of "IRNSS" is _____.

(a) Indian Research Navigation Satellite System

(b) Indian Regional Navigation Satellite System

(c) Indian Research Navigation Space Satellite System

(d) Indian Regional Navigation Space Satellite System

10. Consider the following statements for a Bipolar Junction Transistor.

1. It is a current controlled device.

2. It is made up of three different types of semiconductor materials.

3. Both the majority and minority carriers participate in the conduction process.

4. The minority current component is dependent upon temperature.

Which of these statement(s) is(are) correct?

- (a) 1, 2, 3 and 4
- (b) 2, 3 and 4
- (c) 1, 3 and 4
- (d) 1, 2 and 3

Section B

Five Questions of 02 Marks each. SHORT ANSWER TYPE QUESTIONS

- 11. Explain Zener diode operation and its applications?
- 12 Write conditions for Transistor biasing Define transistor biasing?
- 13 "Negative Voltage feed-back" mention its advantages?
- 14. "Modulation" and explain need for modulation?
- 15. Explain the principle of radio detection and finding?

Section C

Seven Long Answer type Questions . Answer any Five.

10 X 5 = 50 Marks

- 16. (a) Explain the construction and working of a Light Emitting Diode. (5marks)
- 16. (b) For the Bridge Full Wave Rectifier circuit shown in Figure: C-1, all the diodes are assumed to be identical with forward resistance of 100Ω . (5marks)

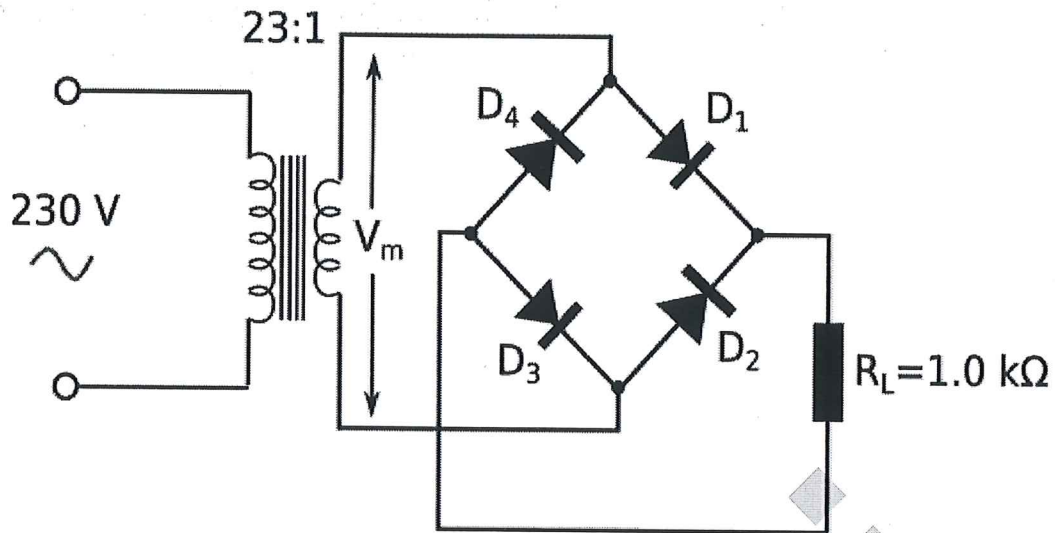


Figure: C-1

- Find
- (a) D.C. output voltage (2 marks)
 - (b) Peak Inverse Voltage (1 marks)
 - (c) Rectification Efficiency (2 marks)

17. (a) Derive the relationship between α and β , where α and β are respectively the current gain in common-base and common-emitter configuration. (5marks)

17. (b) Determine V_{CB} in the transistor circuit shown in Figure: C-2. The transistor is of Silicon and has $\beta = 150$. (5marks)

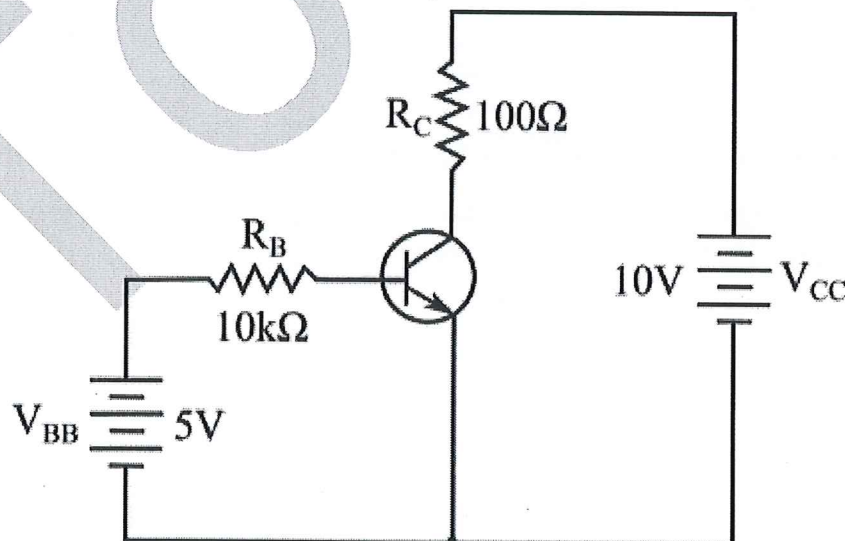


Figure: C-2

18. (a) Simplify the boolean expression $Y = \overline{A \cdot \overline{B}} \cdot (A + C) + \overline{A} \cdot B \cdot (\overline{A + B + C})$ and implement the simplified expression using logic circuit diagram. (5marks)

18. (b) Draw the output waveform of Class-A and Class-B amplifiers. Mention the conduction angle of Class-A, Class-B, and Class-C amplifiers. (5marks)

19. (a) Draw a neat and clean circuit diagram of transistor Wein Bridge Oscillator. Write the expression for the frequency of oscillation. (5marks)

19. (b) Draw a neat and clean circuit diagram of Hartley Oscillator. Write the expression for the frequency of oscillation. (5marks)

20. (a) A frequency modulated voltage wave is given by the equation: (5marks)

$$Y_{FM} = 12\cos(6 \times 10^8 t + 5\sin(1250t))$$

Find

- (a) carrier frequency
- (b) signal frequency
- (c) modulation index
- (d) maximum frequency deviation
- (e) power dissipated by the FM wave in 10Ω resistor

20. (b) Explain the limitations of Amplitude Modulation. (5marks)

21. (a) Explain the operation of Tuned Radio Frequency receivers using a block diagram. (5marks)

21. (b) Explain the working of RADAR with a neat block diagram. (5marks)

22. (a) Explain the Flag register in 8085 microprocessor. (5marks)

22 (b) Draw a neat and clean diagram of the internal architecture of 8085 microprocessor. (5marks)

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