

12.12.18(M)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 453

IC

Unique Paper Code : 42227530

Name of the Paper : Digital Analog and
Instrumentation

Name of the Course : B.Sc. (Prog.) : DSE – 3A

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all including Question No. 1, which is compulsory.

1. Attempt any **five** of the following. Each question carries equal marks. (3×5=15)

(a) Convert the decimal no 23 into a binary and find the 2's complement of the binary number so obtained.

(b) Draw the logic circuit for X-NOR gate and write its truth table and boolean expression.

P.T.O.

- (c) Explain construction and working of an LED.
- (d) Draw input and output characteristics of a common base transistor configuration.
- (e) Draw the pin out diagram of a 555 timer IC.
- (f) What is Peak Inverse Voltage (PIV)? Determine its value for a center-tapped full wave rectifier.
- (g) Implement the basic gates viz- AND, OR & NOT, using any of the universal gates.

2. (a) Using K-map simplify the following logic function.

$$Y = F(A, B, C, D) = \sum m(1, 2, 3, 6, 8, 9, 10) + \sum d(12, 13, 14)$$

Implement the final boolean expression in a logic circuit and write the truth table. (10)

- (b) Simplify the following expressions using boolean algebra techniques.

$$(i) Y = ABC'D' + A'BC'D' + A'BCD' + ABCD'$$

$$(ii) Y = AB + A(B+C) + B(B+C) \quad (5)$$

3. (a) Write truth table for a full subtractor and derive its Boolean expression using SOP method. Draw a logic circuit diagram for the same. (8)

- (b) Explain construction and working of a Photodiode with the help of a neat diagram. Draw the characteristics also. Give one application of Photodiode. (7)

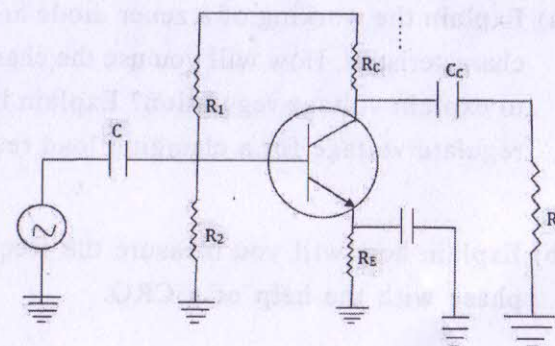
4. (a) Describe the potential divider biasing method for a bipolar junction transistor in detail. How will you stabilize operating point by this method? (10)

- (b) For the transistor amplifier shown in the following figure

(i) Draw dc load line

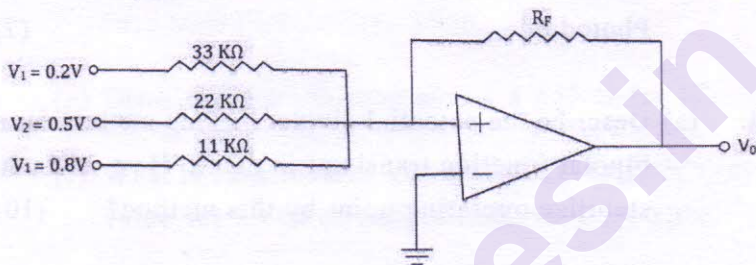
(ii) Determine operating point.

Given $R_1 = 10K\Omega$, $R_2 = 5K\Omega$, $R_c = 1K\Omega$, $R_E = 2K\Omega$ and $R_L = 1K\Omega$ (5)



5. (a) Explain the working of an inverting and non inverting op-amp. and obtain an expression for voltage gain. (10)

- (b) Calculate the output voltage of the circuit for $R_f = 68 \text{ K}\Omega$. (5)



6. (a) Using h-parameter for CE amplifier obtain an expression for input impedance, output impedance, current gain and voltage gain. (10)
- (b) Explain Barkhausen's criterion for sustained oscillations. (5)
7. (a) Explain the working of a zener diode and draw its characteristics. How will you use the characteristics to explain voltage regulation? Explain how will it regulate voltage for a changing load resistance. (10)
- (b) Explain how will you measure the frequency and phase with the help of a CRO. (5)