8. (a) Discuss 1: 4 De-MUX with the help of logic gates. (4)

   (b) Discuss clocked JK flip-flop. Explain toggling. (6)

   (c) Explain 4-bit ripple counter using JK flip flop. (4)

UNIT - V

9. (a) Explain why modulation is necessary for the transmission of intelligence. (3)

   (b) Derive the expression for the spectrum of an AM wave. What is the relative power in each sideband when modulation coefficient is 0.5? (4+3)

   (c) Discuss the advantages of FM over AM . (4)

10. (a) What is sampling theorem? (2)

    (b) Explain the principle of (2x2=4)

        i) PWM

        ii) PAM

    (c) Discuss PCM in details. (4)

    (d) Explain with the block diagram the different components of an optical fibre communication system. (4)

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PG (CBCS) ODD SEMESTER EXAMINATION, 2022

PHYSICS

1st Semester

Course No. : PHYCC - 104

(Electronics)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

1. (a) Discuss the main differences between zener and avalanche breakdown. (4)

   (b) Explain the action of a transistor as a switch. (4)

   (c) Calculate the stability factor for a potential divider biasing of a transistor. (6)

2. (a) Discuss the construction and working principle of a *n*-channel JFET. (6)

   (b) Describe *h*-parameters and explain why *h*-parameters are the most commonly used parameters of a junction transistor. (4)

(c) A transistor with the current gain $\alpha = 0.98$ is connected in a common base mode and gives a reverse saturation current I_{CO}=12μA. Find the base and collector current for an emitter current of 2 mA. (4)

UNIT - II

3. (a) Explain with block diagram of the different feedback topologies. (4)

(b) Explain how the bandwidth of an amplifier increases with negative feedback. (4)

(c) Describe in short the construction and working of a Solar Cell and GUNN diode. (3+3)

4. (a) Obtain the expression for the frequency of oscillation and condition for a RC phase shift oscillator (transistor version). (8)

(b) Explain with neat diagram the construction and working principle of UJT. Calculate the frequency of oscillation when UJT is used as a relaxation oscillator. (6)

UNIT - III

5. (a) Discuss op-amp as (2x4=8)

(i) Inverting amplifier

(ii) Non-inverting amplifier

(iii) Adder (or Summing amplifier)

(iv) substractor

(b) Explain slew-rate and power bandwidth of an op-amp. (2)

(c) Define the terms: input bias current, input offset voltage, input offset current and CMRR. (4)

6. (a) Discuss the function of an op-amp as log and anti-log amplifier. (4)

(b) Discuss how an op-amp can be used as a comparator. (4)

(c) Explain Schmitt trigger using op-amp. (6)

UNIT - IV

7. (a) Simplify the following Boolean expression (4)

(i) $AB + \overline{AC} + A\bar{B}C(AB + C)$

(ii) $AB + A(B + C) + B(B + C)$

(b) Design a combinational logic circuit to convert the XS3 code into the standard 8421 code as shown below (10)

Decimal Number	XS3					BCD 8421			
	Minterms	Input				Output			
		A	B	C	D	W	X	Y	Z
0	3	0	0	1	1	0	0	0	0
1	4	0	1	0	0	0	0	0	1
2	5	0	1	0	1	0	0	1	0
3	6	0	1	1	0	0	0	1	1
4	7	0	1	1	1	0	1	0	0
5	8	1	0	0	0	0	1	0	1
6	9	1	0	0	1	0	1	1	0
7	10	1	0	1	0	0	1	1	1
8	11	1	0	1	1	1	0	0	0
9	12	1	1	0	0	1	0	0	1