

COMPUTER SCIENCE

ANALOG AND DIGITAL ELECTRONICS

Time : Three hours

Maximum : 80 marks

Answer any **FIVE** full questions.

Draw circuit diagrams wherever necessary.

1. (a) What is comparator? Explain its working with a neat circuit.
(b) Explain the working of full wave rectifier with capacitor filter and write down an expression for ripple factor.
(c) What is meant by load line? What is its significance? (4 + 8 + 4 = 16)
2. (a) Discuss bias stability in self bias circuit.
(b) Draw and explain the hybrid model of the transistor in CE configuration.
(c) What is feedback? Derive an expression for transfer gain in feedback amplifiers. (6 + 6 + 4 = 16)
3. (a) Explain the differences between Class A and Class B power amplifiers.
(b) State and prove Miller's theorem.
(c) What are coupling capacitor? and by pass capacitor? Explain its function. (6 + 6 + 4 = 16)
4. (a) Explain how 555 timer IC works as astable multivibrator.
(b) For monostable multivibrator using IC-555 value of $R = 5.6 K\Omega$ and $C = 0.1 \mu F$. Determine the time period T- and draw the circuit diagram.
(c) Write a note on harmonic distortion.
(d) Write the truth table for NAND gate and XOR gate. (6 + 4 + 4 + 2 = 16)
5. (a) State and prove De-Morgan's theorem.
(b) Using 2's compliment method perform subtraction of the following numbers :
(i) $78_{(10)} - 23_{(10)}$
(ii) $98_{(10)} - 56_{(10)}$
(c) Simplify : $A = (x + \bar{x}\bar{y})(\bar{x} + \bar{y}) + yz$. (6 + 6 + 4 = 16)

6. (a) Convert the following :
- $(1011.101101)_2 = \underline{\hspace{2cm}}_{(8)}$
 - $(C8.AB)_{16} = \underline{\hspace{2cm}}_{(8)}$
 - $(25.52)_8 = \underline{\hspace{2cm}}_{(2)}$
- (b) Perform the following conversions :
- 1011011 (Gray) = $\underline{\hspace{2cm}}$ (Binary)
 - 0100101 (Binary) = $\underline{\hspace{2cm}}$ (Gray)
- (c) Explain the working of full adder. (6 + 4 + 6 = 16)
7. (a) Solve using K-map and draw logic diagram for resulting expressions
 $f(A, B, C, D) = \Sigma(0, 2, 5, 7, 8, 10, 12, 13, 14, 15)$
- (b) Define encoder and design 8 : 3 encoder.
- (c) Explain the working of S-R flip flop. (6 + 6 + 4 = 16)
8. Write a short note on the following (any **FOUR**) : (4 + 4 + 4 + 4 = 16)
- ASCII code
 - Multiplexers
 - CMOS Inverter
 - D - Flip Flop
 - IC families
 - Biased clipper