



## Marking Scheme

### End-Sem Examination, Winter 2025

Academic Year: 2025-2026	Semester: I
Class: FY	Program: B.Tech.
Branch Code: ETC/ADS/CSD	Pattern: 2023
Name of Course: Fundamentals of Electronics Engineering	Course Code: 2300107A

Q. No.	Details	Max. Marks	CO No.
Q.1	<p>With the help of a neat circuit diagram and waveforms, explain the working of a full wave bridge rectifier. (6 marks)</p> <p><b>Marking scheme:</b> Circuit diagram 2 marks Explanation 3 marks Waveforms 1 mark</p>	[6]	CO3
Q.2	<p>How the BJT can be used as an amplifier? Explain. (6 marks)</p> <p><b>Marking scheme:</b> Circuit diagram 2 marks Explanation 3 marks Waveforms 1 mark</p>	[6]	CO3
Q.3	<p>a) Draw and explain the symbol of an operational amplifier. Also explain the following OpAmp parameters with their ideal and practical values: i) Slew Rate ii) CMRR (8 marks)</p> <p><b>Marking scheme:</b> OpAmp symbol 2 marks Explanation of pins 2 marks Explanation of parameter 1 mark each Values of parameter 1 mark each</p> <p><b>OR</b></p> <p>b) Draw and explain the pin diagram of IC 741. Also explain the following OpAmp parameters with their ideal and practical values: i) Input offset current ii) Input impedance (8 marks)</p>	[16]	CO1



	<p><b>Marking scheme:</b> OpAmp pin diagram 2 marks Explanation of pins 2 marks Explanation of parameter 1 mark each Values of parameter 1 mark each</p>		
	<p>c) Derive the expression for the voltage gain of an Op-Amp based non inverting amplifier. In an Op-Amp based non inverting amplifier, if <math>R_f = 47 \text{ k}\Omega</math>, <math>R_1 = 4.7 \text{ k}\Omega</math>, <math>\pm V_{cc} = \pm 15\text{V}</math> and <math>V_{in} = 2 \text{ Vdc}</math> then find output of the circuit and comment on the output. (8 marks)</p> <p><b>Marking scheme:</b> Circuit diagram of non inverting amplifier 2 marks Explanation with derivation of gain 3 marks Calculation of output voltage 1 mark Calculation of <math>\pm V_{sat}</math> 1 mark Comment on output 1 mark</p> <p><b>OR</b></p> <p>d) Design an Op-Amp based circuit to convert a sine wave to a square wave without phase shift between input and output. Draw the input and output waveforms for the same circuit considering <math>V_{in} = 10 \text{ Vpp}</math> sine wave and <math>\pm V_{cc} = \pm 12 \text{ V}</math>. (8 marks)</p> <p><b>Marking scheme:</b> Explanation and working of proposed circuit 3 marks Circuit diagram of non inverting comparator 2 marks Calculation of <math>\pm V_{sat}</math> 1 mark Input and output waveforms 2 marks</p>		CO3
<b>Q.4</b>	<p>a) With the help of the symbol, logic expression and truth table, explain NAND gate and NOR gate. Also convert <math>(A1B.3)_{16}</math> to octal. (8 marks)</p> <p><b>Marking scheme:</b> Symbol, logic expression and truth table 2 marks for each gate Number conversion 4 marks</p> <p><b>OR</b></p>	[16]	CO2



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	<p>b) With the help of the symbol, logic expression and truth table, explain EX-OR gate and EX-NOR gate. Also convert <math>(126.12)_{10}</math> to hexadecimal. (8 marks)</p> <p><b>Marking scheme:</b> Symbol, logic expression and truth table 2 marks for each gate Number conversion 4 marks</p>		
	<p>c) What is full adder? Derive the expression for its sum and carry outputs using truth table. Also draw its logic diagram. (8 marks)</p> <p><b>Marking scheme:</b> Explanation 1 mark Truth table 2 marks Derivation of sum and carry 3 marks Logic diagram 2 marks</p> <p><b>OR</b></p> <p>d) Implement SR flipflop using NAND gates and explain its working. (8 marks)</p> <p><b>Marking scheme:</b> Logic diagram 2 marks Truth table 2 marks Explanation 4 marks</p>		CO4
Q.5	<p>a) Draw and explain the block diagram of electronic communication system. Also write a short note on optical fibre cable. (8 marks)</p> <p><b>Marking scheme:</b> Block diagram 2 marks Explanation 3 marks Structure of optical fibre cable 1 mark Explanation of optical fibre cable 2 marks</p> <p><b>OR</b></p> <p>b) Explain simplex and duplex modes of transmission. Also compare wired communication and wireless communication. (8 marks)</p>	[16]	CO2



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<p><b>Marking scheme:</b> Simplex mode 2 marks Duplex mode 3 marks Comparison of wired and wireless communication - any three points - 1 mark to each</p>		
<p>c) What is modulation? Explain the need of modulation. (8 marks)</p> <p><b>Marking scheme:</b> Concept of modulation 2 marks Need of modulation - any four appropriate points - 1.5 marks to each</p> <p><b>OR</b></p> <p>d) Explain Electromagnetic Frequency Spectrum. (8 marks)</p> <p><b>Marking scheme:</b> EM spectrum diagram 3 marks Explanation with band frequency ranges and applications 5 marks</p>		CO2