K. K. Wagh Institute of Engineering Education and Research, Nashik
(An Autonomous Institute from A.Y. 2022-23)

Marking Scheme

End-Sem Examination, Winter 2025

Academic Year: 2025-2026	Semester: I
Class: FY	Program: B.Tech.
Branch Code: ALL	Pattern: 2022
Name of Course: Fundamentals of Electronics Engineering	Course Code: FYE221007

Q. No.	Details	Max. Marks	CO No.
Q.1	With the help of a neat circuit diagram and waveforms, explain the working of a full wave bridge rectifier. (6 marks) **Marking scheme:** Circuit diagram 2 marks Explanation 3 marks Waveforms 1mark	[6]	CO3
Q.2	How the BJT can be used as an amplifier? Explain. (6 marks) **Marking scheme:** Circuit diagram 2 marks Explanation 3 marks Waveforms 1 mark	[6]	CO3
Q.3	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) **Marking scheme:** OpAmp symbol 2 marks Explanation of pins 2 marks Explanation of parameter 1 mark each Values of parameter 1 mark each **OR** 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)	[16]	CO1

	Marking scheme: OpAmp pin diagram 2 marks Explanation of pins 2 marks Explanation of parameter 1 mark each Values of parameter 1 mark each		
	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 Rf = 47 kΩ, R1 = 4.7 kΩ, ±Vcc = ±15V and Vin = 2 Vdc then find output of the circuit and comment on the output. (8 marks) **Marking scheme:** Circuit diagram of non inverting amplifier 2 marks Explanation with derivation of gain 3 marks Calculation of output voltage 1 mark Calculation of ±Vsat 1 mark Comment on output 1 mark **OR** 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 Vin = 10 Vpp sine wave and ±Vcc = ±12 V. (8 marks) **Marking scheme:** Explanation and working of proposed circuit 3 marks Circuit diagram of non inverting comparator 2 marks Calculation of ±Vsat 1 mark Input and output waveforms 2 marks		CO3
Q.4	a) With the help of the symbol, logic expression and truth table, explain NAND gate and NOR gate. Also convert $(A1B.3)_{16}$ to octal. (8 marks) **Marking scheme:** Symbol, logic expression and truth table 2 marks for each gate Number conversion 4 marks **OR**	[16]	CO2

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

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