

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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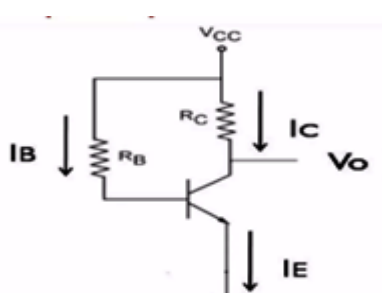
Second Semester B.E. Degree Examinations, July 2026

FUNDAMENTALS OF ELECTRONICS & COMMUNICATION ENGINEERING

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBT:CO: PI)</u>
Module-1			
1.	a. Explain the operation of a PN junction diode under no bias, forward bias, and reverse bias conditions with V-I characteristics.	08	(2 : 1: 1.3.1)
	b. With a neat circuit diagram and waveform, explain HWR with capacitor filter.	06	(2 : 1: 1.3.1)
	c. With a neat circuit diagram and wave form, explain Zener diode as a voltage regulator with no load.	06	(2 : 1: 1.3.1)
(OR)			
2.	a. With a neat circuit diagram and waveform, explain full wave bridge rectifier and show that efficiency of FWR is 81 %.	08	(2 : 1: 1.3.1)
	b. Discuss the load and line regulation using Zener diode with a neat circuit diagram.	06	(2 : 1: 1.3.1)
	c. The input voltage to a HWR is $V = 200 \sin 50t$. If $R_L = 1 \text{ k}\Omega$ and forward resistance of diode is 50Ω . Find (i) Average load current (ii) RMS load current (iii) Efficiency (iv) Ripple factor.	06	(3 : 1: 2.1.2)
Module-2			
3.	a. Describe the working of the common emitter configuration and draw the input and output characteristic curves.	08	(2 : 2: 1.3.1)
	b. For the circuit shown in Fig. Q3(b), Si transistor with $\beta = 50$, $V_{BE} = 0.7 \text{ V}$, $R_B = 100 \text{ k}\Omega$, $R_C = 1 \text{ k}\Omega$ is used. Draw the DC load line and determine the operating point.	06	(3 : 2: 2.1.2)
			
Fig. Q3(b)			
	c. Explain the operation and characteristics of N-channel JFET with necessary diagram,	06	(2 : 2: 1.3.1)
(OR)			
4.	a. Explain the construction, operation and characteristics of N-channel depletion MOSFET with necessary diagram.	08	(2 : 2: 1.3.1)
	b. Derive the relationship between α and β in a bipolar junction transistor.	06	(2 : 2: 1.3.1)
	c. Calculate I_C and I_E for transistor that has $\alpha_{dc} = 0.98$ and $I_B = 100 \mu\text{A}$. Also determine value of β_{dc} for a transistor.	06	(3 : 2: 2.1.2)

Note: (RBT:CO: PI) - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

Module-3

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|----|----|---|----|-----------------|
| 5. | a. | List and explain the ideal characteristics of OP-AMP | 08 | (2 : 3: 1.3.1) |
| | b. | Design an adder using OP-AMP to give the output voltage of $V_o = - [2V_1 + 3V_2 + 5V_3]$ | 06 | (3 : 3 : 2.1.2) |
| | c. | Derive an equation for output voltage and gain of an OP-AMP as inverting amplifier. | 06 | (2 : 3: 2.1.2) |

(OR)

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|-----------|---|-----------|-----------------------|
| 6. | a. Derive an expression for output voltage of an OP-AMP Integrator and Differentiator | 08 | (3 : 3: 2.1.2) |
| | b. Explain the different input modes of OP-AMP. | 06 | (2 :3 : 1.3.1) |
| | c. Determine the output voltage of the circuit shown in Fig, Q6(c). Given $V_1=1V$ and $V_2= 3V$. | 06 | (3 : 3: 2.1.2) |

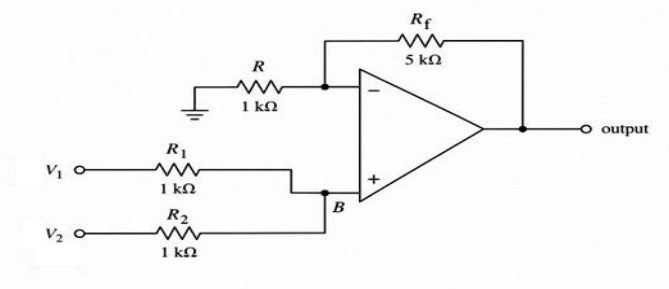


Fig. Q6(c)

Module-4

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|----|----|---|-----------|------------------------|
| 7. | a. | Explain full adder. Design full adder using two half adder and an OR gate. | 08 | (3 : :4 2.1.2) |
| | b. | Convert the following
(i) $(1111101011.011)_2 = (?)_{10} = (?)_{16} = (?)_8$ (ii) $(186.75)_{10} = (?)_2 = (?)_8 = (?)_{16}$ | 06 | (3 : 4: 2.1.2) |
| | c. | Simplify the following
(i) $\overline{A}BCD + \overline{A}BCD + \overline{A}BCD + \overline{A}BCD$ (ii) $C(B+C)(A+B+C)$ | 06 | (3 : 4 : 2.1.2) |

(OR)

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|-----------|--------------------|---|---------------|------------------------|
| 8. | a. | Subtract $(26)_{10}$ from $(30)_{10}$ using 1's and 2's complement. | 08 | (3 : 4 : 2.1.2) |
| | b. | Convert the given expression into canonical form | 06 | (3 : 4 : 2.1.2) |
| | | (i) $F(A, B, C) = AC + AB + \overline{B}\overline{C}$ | | |
| | | (ii) $F(A, B, C) = (\overline{A} + \overline{B})(B + C)(A + C)$ | | |
| | c. | Explain the following : | 06 | (2 : 4 : 1.3.1) |
| | (i) Literal | (ii) sum term | (iii) Minterm | |
| | (iv) Canonical POS | (v) SOP | (vi) Maxterm | |

Module-5

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|-------------|--|-----------|-----------------------|
| 9. | a. Compare embedded systems and general computing systems. Also provide major application areas of embedded system. | 08 | (2 : 5: 1.3.1) |
| | b. With a neat block diagram, explain the elements of an embedded system. | 06 | (2 : 5: 1.3.1) |
| | c. Define modulation. With the help of waveforms, explain AM and FM. | 06 | (2 : 5: 1.3.1) |
| (OR) | | | |
| 10. | a. Describe the blocks of basic communication system with neat block diagram. | 08 | (2 : 5: 1.3.1) |
| | b. Differentiate between RISC and CISC. | 06 | (2 : 5: 1.3.1) |
| | c. Explain the classification of embedded systems based on generation. | 06 | (2 : 5: 1.3.1) |

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