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SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY

Subject Code: BEC-201

Subject: Fundamentals of Electronics Engineering

Course: B.Tech.Semester: 2nd

SECOND SESSIONAL EXAMINATION, EVEN SEMESTER, (2024-2025)

Branch: (CS, CE, EC, ME, EE)

Time –1hr. 30 min.

Maximum Marks – 30

1. Attempt any FIVE questions:

Q N	QUESTIONS	Marks	CO	BL
a.	What are the binary-arithmetic operations for $11.10 + 10.11 + 111.00 + 110.11 + 001.01 = ?$	2	CO4	L3
b.	Express the Boolean function $F = A + BC$ in a standard SOP form.	2	CO4	L3
c.	Realize basic logic gates by using NOR gate only.	2	CO4	L3
d.	Define minterm and maxterm of the Boolean function.	2	CO4	L1
e.	Find 1's and 2's complement of 1101001.	2	CO4	L3
f.	Simplify the following logical expression using Boolean algebra $F(A, B, C) = \sum m(1, 3, 5)$	2	CO4	L3

2. Attempt any ONE of the following:

Q N	QUESTIONS	Marks	CO	BL
a.	Simplify the following logical expression using K-Map and design logic resultant circuit using basic logic gates only $F(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 13, 15) + d(8, 10)$.	5	CO4	L3
b.	Minimize the following Boolean function in POS form using the K map. $F(A, B, C, D, E) = \prod M(3, 5, 6, 9, 10, 11, 13, 19, 21, 22, 23, 25, 26, 27, 29)$	5	CO4	L3
c.	By showing all the calculations, do as directed: I. $(345)_{10} = (531)_x$ II. $(110110.011)_2 = (?)_{16}$ III. $(231.36)_{10} = (?)_2$ IV. $(534)_8 = (?)_{10}$ V. Perform $(4)_{10} - (9)_{10}$ using 1's complement method.	5	CO4	L3

3. Attempt any FIVE questions:

Q N	QUESTIONS	Marks	CO	BL
a.	Explain the need of modulation in communication system.	2	CO5	L1
b.	Calculate the transmission efficiency if the modulation factor is 0.5.	2	CO5	L1
c.	Explain the block diagram of a communication system.	2	CO5	L1



d.	The un-modulated RMS current of an AM wave is 8.93 A, and it increases to 11.25 A with modulation. Determine the modulation index.	2	CO5	L3
e.	Explain Electromagnetic spectrum starting range of frequencies for each application.	2	CO5	L1
f.	Explain the types of demodulation technique of AM waves.	2	CO5	L1

4. Attempt any ONE of the following:

Q N	QUESTIONS	Marks	CO	BL
a.	Write short notes on any two of the following: I. Fundamentals of Satellite & Radar Communication. II. Different generations and standards in cellular communication system. III. Digital wireless communication system.	5	CO5	L3
b.	Derive the transmission efficiency and total power of amplitude modulated wave assuming message and carrier wave as sinusoidal wave.	5	CO5	L1
c.	An audio frequency signal $5 \sin(2\pi \times 500t)$ is used to AM a carrier of $25 \sin(2\pi \times 10^5t)$. Calculate: I. m_a (Modulation Index). II. Amplitude of each side band. III. P_t (Total Power) IV. BW (Bandwidth) V. Transmission Efficiency (η)	5	CO5	L3

Bloom's Taxonomy Level (BL):

Remember (L1)

Understanding (L2)

Apply (L3)

Analyze (L4)

Evaluating (L5)

Creating (L6)