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Your Roll No. 12405/2023
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Sr. No. of Question Paper : 4507

Unique Paper Code : 32511608

Name of the Paper : Communication Electronics

Name of the Course : B.Sc. (H) Electronics
(CBCS)

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Question no. 1 is compulsory.

3. Attempt five questions in all, including question no. 1.

Use of non-programmable scientific calculators is allowed.

(a) Which frequencies are used for the following applications? (3)

(i) AM Radio

(ii) FM Radio Broadcasting

(iii) AC Power Distribution

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- (b) Show that the ratio of SSB power to total power is $1/6$ for 100% modulation. (3)
- (c) Differentiate between Wide band and Narrow Band Frequency Modulation. (3)
- (d) What are the various types of external noise? (3)
- (e) Differentiate between natural sampling and flat top sampling. (3)
2. (a) Draw the block diagram of an Electronic Communication System and explain each block. (5)
- (b) Write an expression for a carrier amplitude modulated by the following message signal :
- $$v_m(t) = V_1 \sin \omega_m t + V_2 \sin 2\omega_m t + V_3 \sin 3\omega_m t$$
- Also, plot the frequency spectrum of this wave and calculate the total modulation index. (6)
- (c) An AM transmitter radiates 10kW with the carrier unmodulated, and 12kW when the carrier is sinusoidally modulated. Calculate the modulation index. If another sine wave is simultaneously transmitted with modulation index of 0.4, determine the total radiated power. (4)

3. (a) How is SSB generated using the Weaver's method? What is the main advantage of this method? (6)
- (b) Explain generation of a DSB-SC signal using a Balanced Modulator. (5)
- (c) What is VSB modulation? Under what circumstances is it preferred over SSB? Give one application of VSB. (4)
4. (a) Derive an expression for an FM signal when the carrier is modulated by a sinusoidal message signal. What is the ideal bandwidth required for transmission of this FM signal? Also, determine the relationship between total modulated power and carrier power in FM. (6)
- (b) Describe the detection of an FM signal using the Phase Locked Loop. (5)
- (c) A 100MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 100kHz. Determine the modulation index and the appropriate bandwidth of the FM signal if the frequency of the modulating signal is:
- (i) 200kHz
 - (ii) 20kHz
- (4)

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5. (a) Define the terms signal to noise ratio and noise figure of a receiver. Derive an expression for the overall noise factor of a system comprising of three amplifiers in cascade. (6)
- (b) Differentiate between low level and high-level modulation with the help of suitable block diagrams. (5)
- (c) In a superheterodyne receiver, the Q of the antenna coupling circuit is 100. If the intermediate frequency is 455kHz, calculate the image frequency and its rejection ratio (in dB) at 1500kHz. (4)
6. (a) State and prove Sampling theorem. (6)
- (b) Illustrate the generation of a PWM wave using a suitable circuit. Sketch the PWM waveform. (5)
- (c) List the main advantages of pulse digital modulation schemes over pulse analog modulation schemes. (4)
7. (a) Describe μ -law and explain how it is used to achieve non-uniform quantization. (6)
- (b) Give the block diagram of a DPCM encoder. What are the advantages of DPCM over PCM? (5)
- (c) What are the two types of noise observed in Delta modulation. How can they be minimised? (4)

(1000)