(3 Hours)   **[Total Marks : 80**

N.B. : 1. Question ONE is compulsory

2. Solve any THREE out of remaining questions

3. Draw neat and clean diagrams

4. Assume suitable data if required.

Q. 1.   A. Give reasons for the following

        I. FET is called as a square law device

        II. Barkhausens criteria should be satisfied to get oscillations

   B. With neat diagram explain any one application of Zero-Crossing Detector   5

   C. With neat circuit diagram explain the use of PLL as a phase shifter   5

   D. Explain with suitable example what do you understand by signal multiplexing? 5

Q. 2   A. Draw and explain JFET characteristics. Also show that for a JFET

$$g_m = \frac{2}{|V_P|}\sqrt{I_{DSS} \cdot I_{DS}}$$ 10

   B. With respect to op-amp explain the ideal characteristics and concept of virtual aground. Explain how op-amp can be used as an averaging amplifier in Inverting configuration. Also draw neat circuit diagrams to

      I.   convert sine wave to square wave using op-amp.

      II.   detect the crossing of zero's in the generated square wave.   10

Q. 3   A. Explain how operational amplifier can be used for addition of two AC signals with one DC signal.   5

   B. Explain fly wheel effect in Class C amplifier.   5

   C. What is sampling theorem and state its significance in communication. What is the standard frequency for speech signal?   5

   D. Determine the magnitude of g_m for a JFET with $I_{DSS} - 8$ mA and $V_P = -4$ V at the following dc bias points:

      (a) $V_{GS} = -0.5$ V.

      (b) $V_{GS} = -1.5$ V.

      (c) $V_{GS} = -2.5$ V.   5

TURN OVER

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Q. 4   A. Explain generation of SSB using phase shift method.   10

B. Discuss the operating principle of PLL and explain its use as frequency translator.   10

Q. 5   A. With neat diagram explain the circuit for FM detection.   10

B. Explain amplitude modulation for more than one modulating signal in the following cases

      (i) Mathematical equation

      (ii) AM waveform

      (iii) AM amplitude and power spectrum

      (iv) Modulation Coefficient

      (v) Transmission Power   10

Q. 6   A. Explain application of PLL as frequency synthesizer   5

B. With block diagram explain TDM-PCM system?   5

C. Write short note on generation of FM by Armstrong method.   5

D. Compare different biasing techniques for JFET   5

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