

S.E. (Computer) III CBSE

Electronics Ckts & Communication

(ECCF)

QP Code : 14577

(3 Hours)

[Total Marks : 80

- N.B :** (1) Question no. **one** is **compulsory**.
(2) Solve any **three** out of remaining questions.
(3) Assume suitable data if required.

1. Solve the following :— 20
- (a) Mention five important specifications of ADC/DAC that are looked at while selecting them for any application.
 - (b) Discuss the factors that influence modulation index of an FM wave.
 - (c) Draw FET based Hartley and Colpitt Oscillator. What is the frequency of oscillation if
 - (i) $L_1 = 10 \text{ mH}$, $L_2 = 10 \text{ mH}$ and $C = 0.1 \mu\text{F}$ for Hartley tank circuit
 - (ii) $L = 10 \text{ mH}$, $C_1 = 0.1 \mu\text{F}$ and $C_2 = 0.1 \mu\text{F}$ for Colpitt tank circuit.
 - (d) A public address system is connected to a microphone that has a maximum output voltage of 10mV. The microphone is connected to a 10 watt audio amplifier system that is driving an 8 Ohm speaker. The voltage amplifier is a noninverting op-amp circuit. Calculate the maximum voltage gain for the voltage amplifier stage and determine the resistor values to obtain the desired gain. Assume the power amplifier stage has a voltage gain of 1.
2. (a) With proper circuit diagrams and transfer characteristics indicating Q-points do comparison of JFET bias circuits in detail. 10
- (b) Find R_1 and R_2 in the lossy integrator so that the peak gain is 20 dB and the gain is 3 dB down from its peak when $\omega = 10,000 \text{ rad/s}$. Use capacitance of $0.01 \mu\text{F}$. 10
3. (a) Sketch a block representation for an n-channel JFET, showing bias voltages, depletion regions, and current directions. Label the device terminals and explain its operation. Explain the effect of increasing levels of negative gate-source voltage. Also sketch a typical drain characteristics for $V_{GS} = 0$ for an n-channel JFET. Explain the shape of the characteristic, identify the regions, and indicate the important current and voltage levels. 10
- (b) Draw the spectrum of an amplitude modulated wave and explain its components. 5
- (c) Draw and explain opamp non inverting comparator. Draw input and output waveforms for V_{ref} positive and also for V_{ref} negative. 5
4. (a) Explain the working of a superheterodyne receiver with the help of a neat block diagram. Show the waveforms at the output of each block. 10
- (b) What is DSBSC wave? Explain its generation using balanced modulator. 10

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5. (a) Draw the PAM, PWM and PPM waveforms in time domain assuming a sinusoidal modulating signal. Explain them in brief. 10
- (b) The maximum deviation allowed in a FM broadcast system is 75kHz. If the modulating signal is a single tone sinusoidal of frequency 15kHz, find the bandwidth of the FM signal. How does the bandwidth change if the modulating frequency is doubled? 5
- (c) How is adaptive delta modulation superior to delta modulation? 5
6. (a) What do you understand by signal multiplexing? Explain TDM and FDM with suitable examples. 10
- (b) With neat circuit diagram explain the use of PLL as phase shifter. 5
- (c) Give advantages and disadvantages of SSB over full carrier DSB amplitude modulated wave. 5
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