

( 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. Explain the concept and significance of CMRR and Slew Rate in case of op-amps. **5**

B. Given  $\beta=120$  and  $I_E= 3.2$  mA for a common-emitter configuration with  $r_0=\infty \Omega$ , determine:

(a)  $Z_i$

(b)  $A_v$  if a load of 2 k $\Omega$  is applied.

(c)  $A_i$  with the 2 k $\Omega$  load. **5**

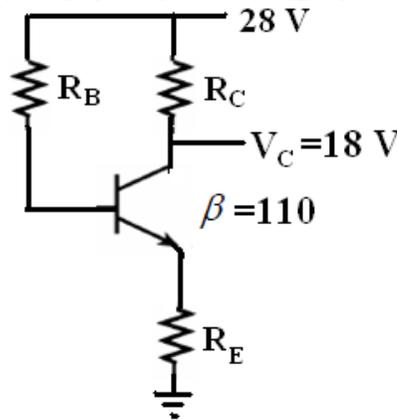
C. Discuss the factors that influence modulation index of an FM wave. **5**

D. Justify that adaptive delta modulation superior to delta modulation. **5**

Q. 2 A. The emitter bias configuration as shown in following figure has the specifications:

$$I_{CQ} = \frac{1}{2} I_{Csat} \quad I_{Csat} = 8 \text{ mA} \quad V_C = 18 \text{ V} \quad \text{and} \quad \beta = 110$$

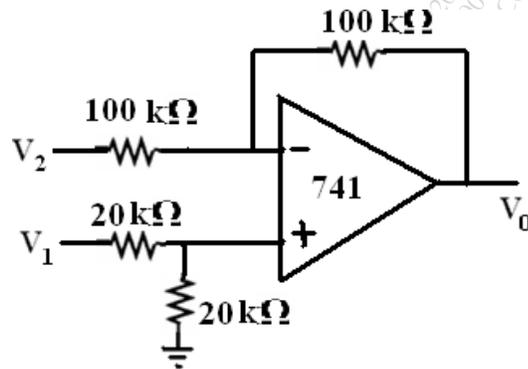
Determine  $R_C$ ,  $R_E$  and  $R_B$ . **10**



B. Explain how op-am can be used comparator and zero crossing detector. **10**

**TURN OVER**

- Q. 3 A. What is the source of the leakage current in a transistor?  
 If the emitter current of a transistor is 8 mA and  $I_B$  is 1/100 of  $I_C$ , determine the levels of  $I_C$  and  $I_B$ . 5
- B. Draw and explain Colpitts oscillator. 5
- C. Explain principle of FDM. 5
- D. Determine the output voltage for the circuit if  $V_1=5V$  and  $V_2=3V$



- Q. 4 A. What is DSBSC wave and explain its generation using balanced modulator. 10
- B. What is multiplexing in communication system? Draw block diagram of TDM-PCM system and explain. 10
- Q. 5 A. State Shannon's theorem on channel capacity.  
 What is the maximum capacity of a perfectly noiseless channel whose bandwidth is 120 Hz, in which the values of the data transmitted may be indicated by any one of the 10 different amplitudes? 10
- B. With respect to neat diagram explain the elements of analog communication system. 10
- Q. 6 A. What is meant by Nyquist rate in sampling and explain its significance. 5
- B. Give the proper definition for entropy and information rate. 5
- C. Write short note on op-amp as differentiator. 5
- D. Differentiate between Class A and Class C power amplifiers with respect to circuit diagram, operating cycle and power efficiency. 5