

BT-4/M-24

44158

ANALOG CIRCUITS

EC-206A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Each question carries 15 marks.

Unit I

1. (a) Differentiate between transconductance and transresistance amplifiers. 10
- (b) Draw the circuit of two stage R-C coupled transistor amplifier and explain the working of it. 5
2. (a) Derive expression for A_v and R_o for common source JFET amplifier 8
- (b) Show that total gain is equal to the product of gains of individual stages in a multi-stage amplifier. 7

Unit II

3. (a) Draw the circuit diagram of class B push pull amplifier and explain its operation. Also prove that its conversion efficiency is 78.5%. 10

(b) Explain the frequency response of amplifier in different regions. **5**

4. An amplifier has a mid band gain of 125 and a bandwidth of 250 kHz. If 4% negative Feedback is introduced, find the new bandwidth and gain. What are the advantages and disadvantages of the introduction of negative feedback in amplifiers ? Explain. **15**

Unit III

5. (a) In a Colpitt's oscillator, the values of the inductors and capacitors in the tank circuit are $L = 30 \text{ mH}$, $C_1 = 200 \text{ pF}$, $C_2 = 400 \text{ pF}$. **10**

- (i) Find the frequency of oscillation.
- (ii) If the output voltage is 15 V, find the feedback voltage.
- (iii) Find the minimum gain, if the frequency is changed by changing 'L' alone.
- (iv) Also find the new frequency of oscillation.

- (b) Derive conditions for sustained oscillations in a RC Phase shift oscillator. **5**

6. What is 555 timer ? Draw and explain its pin diagram. Explain the working and applications of 555 timer monostable multivibrator. **15**

Unit IV

7. (a) Explain the hysteresis plot generated by Schmitt trigger along with its applications. 7
- (b) Draw the circuit of differential amplifier with one Op-Amp and derive the expression voltage gain. 8
8. (a) Explain and derive the current expression of current mirror circuit diagram. 5
- (b) Briefly explain summing amplifier. Draw an adder circuit for the given expression : 10

$$V_0 = - (0.1 V_1 + V_2 + 5V_3)$$