

- N. B. :** (1) Question No. 1 is **compulsory**.
 (2) Solve any **four** questions from the remaining questions.
 (3) Assume **suitable** data wherever **necessary**.

1. Solve following (any **four**) :— 20
- S/H circuit and its application.
 - What is state variable filter ?
 - Compare practical Op-Amp with ideal Op-Amp
 - Define filters. What are different types of filters ? Show their ideal frequency responses.
 - Explain four types of transistorised differential amplifier with suitable block diagrams.
2. (a) Explain the working of following with suitable block diagram : 10
- Voltage to current converter with floating load.
 - Voltage to current converter with grounded load
- (b) Draw and explain the block diagram of IC 723. 10
3. (a) Describe the various steps or processes carried out during the fabrication of ICs. 10
- (b) With a neat diagram explain the working of an averaging amplifier. Derive necessary relation and state its one application. 10
4. (a) Write the various steps in the design of an astable multivibrator for 35% duty cycle. State one application of astable multivibrator. 10
- (b) Design voltage regulator using IC 723 to provide $V_0 = 5\text{ V}$, $I_{L\text{ max}} = 50\text{ mA}$. Foldback current limiting is to be provided at $I_{SC} = 60\text{ mA}$. Assume $V_{\text{sense}} = 0.6\text{ V}$. 10
5. Explain the operation of an Op-Amp as (any **four**) :— 20
- Subtractor
 - Gyrator
 - Clipper
 - Log Amplifier
 - Antilog Amplifier.
6. (a) A 741 Op-Amp is connected as an inverting amplifier where $R_1 = 2\text{ k}\Omega$, $R_F = 16\text{ k}\Omega$. The parameters of Op-Amp are $A_v = 2 \times 10^5$, $R_i = 2\text{ M}\Omega$, $R_o = 75\ \Omega$, $f_o = 5\text{ Hz}$
 Power supply = $\pm 15\text{ V}$, O/P Voltage Swing = $\pm 13\text{ V}$. Calculate A_{vf} , R_{if} , R_{of} , F_f . 10
- (b) Explain and derive the expression of differentiator using Op-Amp. Draw waveforms. Also explain about practical differentiator. 10
7. Explain the following (any **two**) :— 20
- SMPS
 - LM4046
 - IC temperature sensors.
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