

B.E. Fourth Semester (Electronics & Telecommunication) (New)

Analog Electronics - I : 4 ET 03

P. Pages : 2

Time : Three Hours



AU - 2589

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) State and prove the clamping theorem. 6
b) Explain with suitable diagram and waveforms the response of RC high pass circuit to step input. Support your answer mathematically. 8

OR

2. a) RC integrator circuit having upper 3 dB frequency of $\frac{1}{2\pi}$ MHz is given with symmetrical square wave of amplitude $8V_{pp}$ and average value 0 (zero) as input. 7
i) Calculate peak to peak amplitude of O/P.
ii) Draw the steady state response at the output.
b) Explain positive clipping circuit using diodes. How can we change the clipping level? 7
3. a) Draw and explain BJT as a switch using suitable waveforms. Why turn off time of BJT is larger than turn on time? 6
b) Draw and explain the collector coupled astable multivibrator along with suitable waveforms and circuit diagram. How can we change the symmetry of the output waveforms? 7

OR

4. a) For BJT as a switch, define the following parameters. Support your answer with suitable waveform. 7
i) Rise time ii) Fall time
iii) Delay time iv) Storage time
b) Compare and contrast BJT as a switch and JFET switch. 6
5. a) Draw the block diagram of operational amplifier and explain the function of each block. 5
b) Define the following parameters of op-amp and also specify their values for op-amp IC 741C : 8
i) Slew Rate ii) CMRR
iii) PSRR iv) UGB

OR

- 6.**
- a) A typical differential amplifier receives input voltages $V_1 = 100\mu V$ and $V_2 = 80\mu V$. The differential gain of the amplifier is $A_d = 10,000$. Calculate the O/P voltage for
i) CMRR = 5000 ii) CMRR = 50,000
- b) What is offset nulling? Explain its importance in the performance of Op-amp. How it is achieved in Op-amp IC 741?

SECTION - B

7. a) Explain with circuit diagram and frequency response op-amp as an integrator. What are limitations of theoretical integrator circuit. How are they overcome in practical integrator circuit? 8
- b) Show that the closed loop gain of inverting amplifier using op-amp is approximate 6
- $$A_f = \frac{-R_f}{R_1}.$$

OR

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|----|----|--|---|
| 8. | a) | What do you mean by precision rectifier? How it is different from ordinary diode based rectifier? Explain half wave precision rectifier. | 7 |
| | b) | Explain with circuit diagram op-amp as RC phase shift oscillator. How Barkhausen's criteria is satisfied in this circuit? | 7 |
| 9. | a) | Explain with circuit diagram and waveforms op-amp as a non - inverting comparator. How it can be made to work as 'ZCD'? | 7 |
| | b) | Explain op-amp as Astable Multivibrator along with circuit diagram and waveforms. | 6 |

OR

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|-----|----|---|---|
| 10. | a) | What do you mean by 'order' of an active filter? Explain. Design a first order Butterworth LPF for cut off frequency of 7 KHz and passband gain of 2. | 7 |
| | b) | Explain with circuit diagram and suitable waveforms the op-amp as Schmitt trigger. What is hysteresis voltage. | 6 |
| 11. | a) | Explain the block diagram and its operation of basic PLL. | 7 |
| | b) | Define the following terms for PLL.
i) Lock range.
ii) Capture range
iii) Free running frequency. | 6 |

OR

12. a) Explain flash type A to D converter. State its advantages and disadvantages. 7
- b) Explain PLL as frequency translator. 6
