

Internal Assessment Test - II

|       |                              |            |         |
|-------|------------------------------|------------|---------|
| Sub:  | LINEAR IC'S AND APPLICATIONS | Code:      | 10EE56  |
| Date: | 04 / 11 / 2016               | Duration:  | 90 mins |
|       |                              | Max Marks: | 50      |
|       |                              | Sem:       | V       |
|       |                              | Branch:    | EEE     |

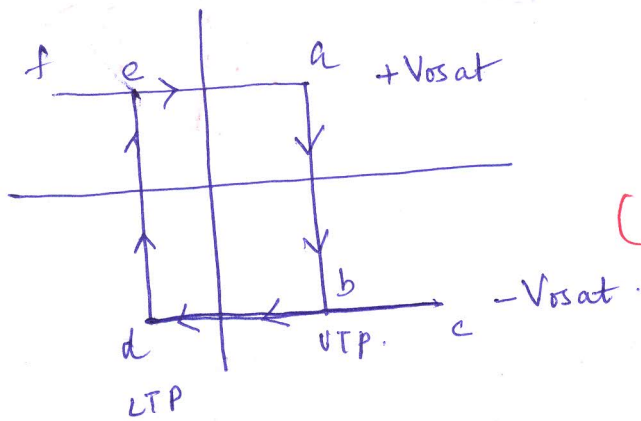
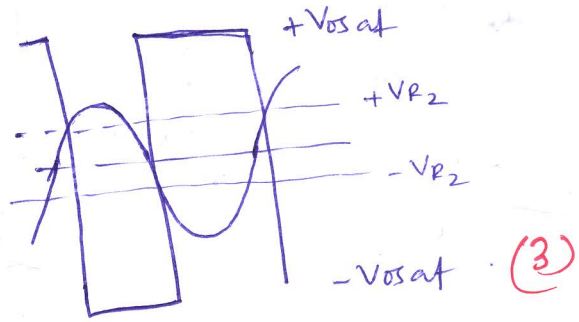
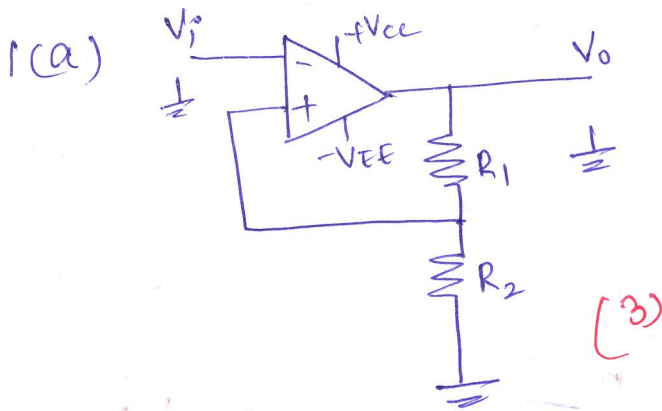
Answer Any FIVE FULL Questions

|       |  | Marks | OBE |     |
|-------|--|-------|-----|-----|
|       |  |       | CO  | RBT |
| 1 (a) | Demonstrate the operation of inverting Schmitt trigger with a neat circuit diagram, waveforms and input-output characteristics.  | [10]  | CO4 | L3  |
| 2 (a) | Design a non inverting Schmitt trigger to have $UTP=+3V$ and $LTP=-5V$ . Use 741 Op-amp with supply voltage $V_{cc}=\pm 15V$ .   | [10]  | CO4 | L3  |
| 3 (a) | Design an Astable multivibrator using a BiFET Op-amp to operate at frequency of 1KHz and amplitude $\pm 10V$ .   | [10]  | CO4 | L3  |
| 4 (a) | Sketch the circuit of One shot multivibrator. Show the voltage waveforms at various points and explain its operation.  | [10]  | CO4 | L3  |
| 5 (a) | Design a triangular/rectangular signal generator with $V_{o(p-p)}=7V$ and frequency range from 100Hz to 1Khz and adjustable duty cycle from 25% to 75%. Use $\pm 12V$ for Op-amps. | [10]  | CO5 | L3  |
| 6 (a) | Design a RC phase shift oscillator to generate a sinusoidal output of 100Hz and supply voltage $\pm 15V$ .   | [6]   | CO5 | L3  |
| (b)   | Explain the method to attain output amplitude in RC phase shift oscillator with circuit diagram.   | [4]   | CO5 | L2  |
| 7 (a) | Sketch the circuit of a second order high pass filter. Explain its operation and design procedure with frequency response curve.   | [10]  | CO6 | L3  |
| 8 (a) | Design a wideband band pass filter to meet the following specifications:- $f_1=5KHz; f_2=15KHz$ and pass band gain =2  | [10]  | CO6 | L3  |

| Course Outcomes |   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1:            | Design AC amplifiers with the specifications given.   | 3   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 1   | 0    | 0    | 1    |
| CO2:            | Explain the necessity of frequency compensations for Op-amps                                      | 2   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 1   | 0    | 0    | 1    |
| CO3:            | Interpret the different signal processing circuits using Op-amps.                                 | 3   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 1   | 0    | 0    | 1    |
| CO4:            | Experiment the different switching applications of Op-amps  | 3   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 1   | 0    | 0    | 1    |
| CO5:            | Design triangular, sine and square waveform generators with the given frequency.                  | 3   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 1   | 0    | 0    | 1    |
| CO6:            | Demonstrate the working of active filters, voltage regulators and special application of Op-amps. | 3   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 1   | 0    | 0    | 1    |

| Cognitive level | KEYWORDS  |
|-----------------|---|
| L1              | List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.                          |
| L2              | summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend                           |
| L3              | Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.            |
| L4              | Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.                                       |
| L5              | Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize. |

PO1 - *Engineering knowledge*; PO2 - *Problem analysis*; PO3 - *Design/development of solutions*; PO4 - *Conduct investigations of complex problems*; PO5 - *Modern tool usage*; PO6 - *The Engineer and society*; PO7- *Environment and sustainability*; PO8 - *Ethics*; PO9 - *Individual and team work*; PO10 - *Communication*; PO11 - *Project management and finance*; PO12 - *Life-long learning*



Explanation (1)

2(a) UTP = 3V    LTP = -5V

Let  $I_2 = 500\mu A$

$$R_2 = \frac{UTP}{I_2} = \frac{3}{500 \times 10^{-6}} = 6k\Omega \text{ (5.6k}\Omega\text{)}$$

$R_2 = 5.6k\Omega$

(2)

For  $V_{cc} = \pm 15V$      $V_{sat} = \pm 13.5V$

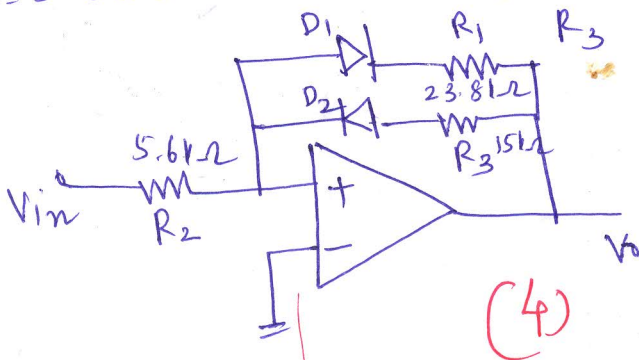
$$UTP = \frac{V_o - V_F}{R_1} \times R_2$$

$$3 = \frac{13.5 - 0.7}{R_1} \times 5.6 \times 10^3$$

for  $R_2 = 5.6k\Omega$

$$LTP = \frac{V_o - V_F}{R_1} \times R_2$$

$$5 = \frac{13.5 - 0.7}{R_3} \times 5.6$$



$R_3 = 14.33k\Omega$

(15)