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Printed Pages : 3

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BT-1 / D-14

## ELEMENTS OF ELECTRONICS ENGINEERING

Paper--EL-101-E, Opt. II

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt any five questions in all, by selecting at least one question from each unit and Question No. 1 is compulsory.

1. (a) List applications of Inductors and Capacitors. 3
- (b) Differentiate between Intrinsic and Extrinsic Semiconductors. Give examples. 3
- (c) Draw circuit of Emitter feedback biasing in BJT. 3
- (d) List characteristics of Practical Op-Amp. 3
- (e) Draw cross sectional diagram of CRO. 3

## Unit-I

2. (a) Explain the working of PN Junction as a diode under (i) Forward bias (ii) Zero Applied Bias (iii) Reverse Bias conditions with its energy band diagram and explain the concept of Built in Potential. 6+3=9
- (b) A full wave rectifier produces an RMS voltage of 10V from a 50Hz line source and feeds resistive load of  $1100\Omega$ . If the filter uses a capacitance of  $C=50\mu F$ . Find DC voltage, voltage regulation and ripple output voltage. 3+2=6
3. (a) Explain the working of Capacitance filter with its characteristics. 5
- (b) Determine the space charge width and electric field in a Silicon PN junction at 300K with doping concentration of  $N_A = 1 \times 10^{16} \text{ cm}^{-3}$  and  $N_D = 1 \times 10^{15} \text{ cm}^{-3}$  for intrinsic concentration of  $1.5 \times 10^{10} \text{ cm}^{-3}$ . 5+5=10

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## Unit-II

4. (a) For a voltage divider biased BJT having Si transistor with  $0.6\text{mA}$  find the values of  $R_1, R_2, R_C, R_E$  such that it meets following specifications over the temperature range  $25^\circ\text{C}$  and  $145^\circ\text{C}$   $\Delta I_C/I_C \leq 10\%$ ,  $V_{BE}$  at  $25^\circ\text{C}$  is  $650 \pm 50\text{mV}$ ,  $I_{CO}$  at  $25^\circ\text{C}$  is  $5\text{nA max}$ ,  $I_{CO}$  at  $145^\circ\text{C}$  is  $3\mu\text{A max}$ . Assume the percentage change in  $I_C$  due to  $V_{BE}$  and  $I_{CO}$  is 5%. 4+2=8
- (b) Write a note on Miller's Theorem. 7
5. (a) Describe the operation RC Coupled Oscillator with necessary circuit diagram. 8
- (b) An amplifier with a negative feed back provides output voltage of 5V with input voltage of 0.2 V. On removal of feedback it needs only 0.1 V input to give same output. Determine (i) Gain without feedback (ii) Gain with feedback (iii) feedback ratio. 7

## Unit-III

6. (a) Give the list of characteristics of ideal OPAMP. 7
- (b) What do you mean by Slew rate, CMRR, Input bias current and output impedance in context to OPAMP? 4+2=8
7. (a) Explain working of OPAMP as a Differentiator. 8
- (b) Explain working of OPAMP as a scale changer. 7

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Unit-IV

8. (a) Explain working of n-channel MOSFET with its characteristics. 8
- (b) Explain construction, working and applications of UJT with its characteristics. 7
9. (a) Explain construction, working and applications of TRIAC with its characteristics. 8
- (b) Explain working of p-channel JFET with its characteristics. 7