

AU – 2561

Third Semester B. E. (Biomedical Engineering) Examination

ELECTRONIC DEVICES AND CIRCUITS

Paper – 3 BM 04

(USC – 10101)

P. Pages : 4

Time : Three Hours]

[Max. Marks : 80

- Note :** (1) Separate answer book must be used for each section in the subject Geology, Engineering material of civil branch and Separate answer book must be used for Section A and B in Pharmacy and Cosmetic Tech.
- (2) Answer **Three** questions from Section A and **Three** questions from Section B.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data wherever necessary.
- (5) Illustrate your answer wherever necessary with the help of neat sketches.
- (6) Use pen of Blue/Black ink/refill only for writing the answer book.

SECTION A

1. (a) Explain the operation of half wave rectifier along with circuit diagram and waveforms. Also show that its ripple factor is 1.21. 8
- (b) Explain the complete block diagram of DC power supply. What are the expected requirements of it ? 6

OR

2. (a) Compare Half wave rectifier, HWR full wave and bridge rectifier. Also comment why full wave rectifiers only are used in practical applications. 7
- (b) Explain the operation of FWR centre tapped rectifier along with capacitor input filter. Also show that ripple factor of capacitor i/p filter is inversely proportional to value of the capacitor. 7
3. (a) Define α , β and γ for CB, CE and CC configurations of BJT. Also derive relation between α and β . 6

AU-2561

P.T.O.

- (b) Draw the experimental set-up for characteristics of CB mode of BJT and explain how can we calculate R_i and R_o from the i/p and o/p characteristics.

7

OR

4. (a) Explain the three regions of operations of BJT. Show these regions on the o/p characteristics of CE mode. 7
- (b) A typical BJT has base current of $50 \mu\text{A}$ while its emitter current is 10 mA . Calculate the values of :
- (i) α (ii) β and (iii) I_C 6
5. (a) Explain the concept of dc load line and operating point support your answer with mathematical expressions and diagrams. 7
- (b) Explain fixed bias circuit for BJT and show that its stability factor is $S = 1 + \beta$. 6

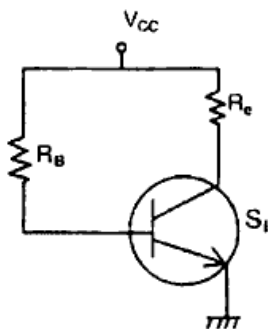
OR

6. (a) A typical fixed bias circuit has following component values

$$V_{CC} = 10\text{V}, R_B = 290 \text{ k}\Omega$$

$$R_C = 2.1 \text{ k}\Omega, \beta = 100 \text{ and } V_{BE} = 0.7 \text{ V.}$$

Calculate the operating point for this. Also determine the region of its operation.



6

- (b) Explain the bias compensation in BJT amplifier with any one example. 7

SECTION B

7. (a) Explain Barkhausen's criteria for sustained Oscillations. Also specifically comment why we need positive feedback in oscillators. 7
- (b) Explain the various timing delays in BJT switching operation along with suitable waveforms. How can we reduce these delays ? 7

OR

8. (a) A typical wein bridge oscillator has $C_1 = C_2 = 100 \text{ nF}$, $R_1 = 15 \text{ k}\Omega$ while R_2 is kept variable. If the o/p frequency is to be varied from 10 kHz to 20 kHz. Calculate the variation range of R_2 . 6
- (b) What do you mean by multivibrator ? Explain bistable multivibrator using waveforms. How is it different from astable multivibrator ? 8
9. (a) Explain construction, operation and characteristics of n-channel JFET. Also prove that $\mu = r_d \times g_m$. <http://www.sgbauonline.com> 6
- (b) Explain construction, working and characteristics of n-channel enhancement type MOSFET. 7

OR

10. (a) A typical n-channel JFET has following specifications :
 $I_{DSS} = 20 \text{ mA}$, $V_{GS(off)} = -6 \text{ V}$ Determine the drain currents I_D for $V_{GS} = 0 \text{ V}$, -2 V , -4 V and -6 V . 6
- (b) Explain the construction, working and characteristics of n-channel depletion type MOSFET. 7
11. (a) Explain the construction, operation and characteristics of photo transistor. State its applications. 7

- (b) Explain the alphanumeric displays. What are various advancements in it ? 6

OR

12. (a) Explain the operating principle and characteristics of LED. How the colours of light emitted by LED can be made different ? 7
- (b) Explain photodiode on the basis of construction and characteristics. 6

