AU – 2514

Third Semester B. E. (Electronics and Telecommunication) Examination

ELECTRONICS DEVICES AND CIRCUITS

3 ET 03

(USC – 11826)

P. Pages : 3

Time : Three Hours] [Max. Marks : 80

Note : (1) Due credit will be given to neatness and adequate dimensions.
(2) Assume suitable data wherever necessary.
(3) Illustrate your answer wherever necessary with the help of neat sketches.
(4) Use pen of Blue/Black ink/refill only for writing the answer book.

1. (a) Show that a Full Wave Rectifier is twice as efficient as Half Wave Rectifier. 7

(b) The output of Full Wave Rectifier if fed from a 40-0-40 V transformer. The load current is 0.1 A. Two 40 μF capacitors are available. The circuit resistance exclusive of the load is 50 Ω.

(i) Calculate the value of L for a two stage L-section filter. The inductances are to be equal. The ripple factor is to be 0.001.

(ii) Calculate the dc output volt. 7

OR

2. (a) Derive an expression for the ripple factor in a full wave rectifier using inductor filter. 7

(b) In a bridge rectifier, the transformer is connected to 220 V, 60 Hz mains and the turns ratio of the stepdown transformer is 11:1. Assuming the diodes to be ideal,
Find :

(i) The voltage across the load

(ii) I_{dc}

(iii) PIV. 7

3. (a) What is early effect ? What are its effects on the characteristics of BJT? 6.

(b) A germanium transistor having $\beta = 100$ and $V_{BE} = 0.2V$ is used in a fixed bias amplifier circuit where $V_{CC} = 16$ V, Rc = 5 kΩ and $R_B = 790$ kΩ. Determine its operating point. 7

OR

4. (a) Define α, β and γ of a transistor. Show how they are related to each other. 6

(b) A CE amplifier is drawn by a voltage source of internal resistance $r_s = 800\ \Omega$ and the load impedance is a resistance $R_L = 1000\ \Omega$. The h-parameters are hie = 1k Ω, hre = 2×10^{-4}, $h_{fe} = 50$ and hoe = 25 μA/V. Compute the current gain A_I, input resistance R_i, voltage gain A_V and output resistance R_o using exact analysis. 7

5. (a) What are the factors which affect the frequency stability of an oscillator ? 3

(b) A Wein bridge oscillator is used for operation at $f_0 = 10$ KHz. If the value of R is 100 kΩ find the value of capacitor. 4

(c) What are the different feedback topologies used in feedback amplifiers ? Explain any one. 6

OR

6. (a) Draw and explain Colpitis oscillator circuit. 7

(b) Explain crystal oscillator in detail. Also explain merits of crystal oscillator compared to other oscillators. 6

7. (a) When two transistors in the CE config. are Cascaded, what does the effective load on the first consists of ? What effect does this have on the voltage gain of the first stage ? 7

(b) Explain Cascade amplifier. 6

OR

8. (a) Draw the circuit diagram of RC coupled amplifier using NPN transistor. Also explain its working. 7

   (b) What do you mean by Bootstraping ? Explain its importance in detail. 6

9. (a) Derive an expression for overall and collector efficiency of class-A power amplifier. 7

   (b) A class B output stage has an efficiency of 60%. If the maximum collector dissipation of each transistor is 2.5 W, calculate the dc input power and ac output power. 6

OR

10. (a) What is Crossover Distortion ? Explain any one method to overcome it. 6

    (b) Prove that conversion efficiency of Class-B power amplifier is 78.5% 7

11. (a) Explain with the help of circuit diagram the working of UJT relaxation oscillator. 7

    (b) With the help of neat diagram, explain the voltage divider biasing method for JFET. 7

OR

12. (a) Compare between depletion type MOSFET and Enhancement type MOSFET. 7

    (b) Draw and explain Drain and Transfer characteristics of JFET. 7