SARDAR PATEL UNIVERSITY
B.Sc. (III SEM.) (CBCS)EXAMINATION
Thursday, 27th December, 2012
2.30 pm to 5.30 pm
US03CPHY01 : Electronics & Optics

Total Marks: 70

Note: Figures to the right indicate full marks of the questions.

Q.1 Multiple choice questions: [10]
  1. A good biasing circuit establish the operating point on a load line.
     (a) near saturation vegion   (b) near cut-off region
     (c) at a middle of active region   (d) out side active region
  2. In a CE amplifier circuit, the phase difference between input and output signal is
     (a) 0   (b) π (c) $\pi/2$ (d) 2π
  3. The circuit that increases the strength of and input signal is known as
     (a) amplifier   (b) filter   (c) buffer   (d) rectifier
  4. Which of the following h-parameter defines input impedance of a CE transistor?
     (a) hii   (b) hie   (c) hfe   (d) him
  5. With negative feedback output impedence of the amplifier
     (a) increases   (b) decreases
     (c) becomes infinite   (d) remains constant
  6. The gain of an emitter follower is always
     (a) greater than 1   (b) equal to 1
     (c) negative   (d) less than 1
  7. Barkhausen criterion of oscillation is
     (a) $A\beta$=1   (b) $A\beta$>1   (c) $A\beta$<1   (d) none of these
  8. The condition for achromatic combination of tenses in contact is
     (a) $\frac{w_1}{f_1} = \frac{w_2}{f_2}$ (b) $\frac{f_1}{w_1} = \frac{f_2}{w_2}$
     (c) $\frac{w_1}{f_1} + \frac{w_1}{f_2} = 0$ (d) $\frac{w_1}{w_2} = \frac{f_2}{f_1}$
  9. Spherical aberration can be removed by using
     (a) convex lens   (b) concave lens
     (c) plano-convex lenses   (d) cylindrical lenses
  10. No. of cardinal points in a lens system is
     (a) two   (b) four   (c) six   (d) eight

Q.2 Answer in short **(Any Six)**   [12]
  1. State requirements of good biasing conditions.
  2. What is thermal runway of transistor? Explain.
  3. What is a small signal amplifier?
  4. Draw h.parameter equivalent circuit of a transistor and label its components.
  5. What are positive and negative feedback?
  6. Draw the diagram of phase shift oscillator.
  7. What is achromatic doublet? Explain.
  8. What is eye piece? State its importance and its types.

Q.3 (a) Explain selection of a proper operating point. [05]
(b) Why operating point shifts? Explain. [03]

OR

Q.3 (a) What is voltage divider biasing circuits? Explain determination of operating point of such circuit using accurate analysis. [05]
(b) Discuss the advantages of voltage divided biasing circuit. [03]

Q.4 (a) What are small signal amplifiers? Draw the circuit of such amplifier and discuss function of each component. Define gain of the amplifier. [05]
(b) Draw an equivalent circuit of a transistor and label its components. [03]

OR

Q.4 (a) What are h-parameters? Explain development of h-parameter equivalent circuit. [05]
(b) Draw the amplifier circuit for (a) DC behaviour (b) Ac behaviour. [03]

Q.5 (a) Derive the expression of voltage gain of negative feedback. [05]
(b) State the types of negative feedback and draw the block representation of it. [03]

OR

Q5 (a) Write a note on 'Emitter follower'. [05]
(b) Explain how the negative feedback in an amplifier helps to stabilize the gain. [03]

Q.6 (a) Explain how positive feedback amplifier works as an oscillator. [04]
(b) What are LC oscillators? State their types and draw their diagrams. [04]

OR

Q.6 (a) Write note on Wein Bridge Oscillator. [05]
(b) The RC network of a Wein bridge oscillator cosmists of resistors and capacitors of values $R_1 = R_2 = 220$ KΩ and $C_1 = C_2 = 250$ pF. Determine the frequency of oscillations. [03]

Q.7 (a) What is chromatic aberration? Explain various types of it. [05]
(b) What do you mean by achromatism of tenses? Explain achromatic doublets. [03]

OR

Q.7 (a) Explain various methods for minimization of spherical aberration. [05]
(b) Write note on 'Coma'. [03]

Q.8 (a) What is co-axial system of lenses? Explain cardinal points of such system. [05]
(b) Two thin convex lenses of focal length 12 cm and 4 cm are kept separate by a distance of 8 cm. Plot the positions of the cardinal points for the combination. [03]

OR

Q.8 (a) Explain the construction and theory of Huggen's eyepiece. [05]
(b) Discuss the comparison between Hggen's and Ramsdan's eyepieces. [03]