

Third Semester B. Sc. Examination (Batch-2010)

Under CBCS

SEAT No. _____

Thursday, 22nd November-2018

Time: 02:00 P.M. To 05:00 P.M.

Subject: PHYSICS [US03CPHY01]

Electronics and Optics

Total Marks 70

N.B: (i) All the symbols have their usual meanings.

(ii) Figures at the right side of questions indicate full marks.

Que.1 Choose the correct option to answer the following MCQs.

[10]

- 1 A good biasing circuit establishes the operating point on a load line ____ .
(a) near saturation region (b) near cut-off region
(c) at a middle of active region (d) outside active region
- 2 In a CE amplifier circuit, the phase difference between input and output signal is ____ .
(a) 0° (b) 180° (c) 90° (d) 240°
- 3 The circuit that increases the strength of and input signal is known as ____ .
(a) buffer (b) filter (c) amplifier (d) rectifier
- 4 The feedback network is also known as ____ network.
(a) α (b) β (c) π (d) μ
- 5 The phase difference between input and output signal of an emitter follower is always ____ .
(a) 0° (b) 180° (c) 90° (d) 270°
- 6 With negative feedback, input impedance of the amplifier ____ .
(a) increases (b) decreases (c) becomes zero (d) remains constant
- 7 The condition to produce sustained oscillations in an amplifier is ____ .
(a) $A = 1$ (b) $\beta = 1$ (c) $A\beta = 1$ (d) $A\beta = -1$
- 8 Spherical aberration produced by a convex lens is ____ .
(a) negative (b) positive (c) zero (d) none of these
- 9 If spreading of the image takes place in a plane perpendicular to the lens axis, the aberration is called ____ .
(a) astigmatism (b) coma (c) curvature of field (d) distortion
- 10 For nodal points, magnification is ____ .
(a) angular (b) transverse (c) zero (d) none of these

Que.2

Answer briefly any Six of the following questions.

[12]

- 1 Why do we need bias stabilization?
- 2 Which are the limitations of fixed bias circuit?
- 3 What are small signal amplifiers?
- 4 Write merits and demerits of negative feedback.
- 5 Give the name of RC oscillators and LC oscillators.
- 6 Enlist various types of aberrations produced by a lens.
- 7 Explain briefly about achromatic doublet.
- 8 What is eye piece? State its importance and its types.

- Que.3 (a) Explain selection of a proper Q point of a transistor in CE mode using output characteristics. [05]
 (b) Draw diagram for a fixed biasing circuit using npn transistor. [03]
- OR**
- Que.3 (a) What is bias circuit? Using collector to base biasing circuit of npn transistor, obtain three coordinates of the Q point. [05]
 (b) What is thermal runaway of transistor? Explain with suitable diagram. [03]
- Que.4 (a) What are small signal amplifiers? With the help of exact and approximate analysis obtain (1) voltage gain (2) current gain (3) power gain [05]
 (b) Draw an equivalent circuit of a transistor and label its components [03]
- OR**
- Que.4 (a) What are h parameters? Obtain relations for four h parameters using its equivalent circuit for a transistor. [05]
 (b) Draw the amplifier circuit for (a) dc behavior (b) ac behavior. [03]
- Que.5 (a) Derive the expression of voltage gain of negative feedback. [05]
 (b) Differentiate between positive and negative feedback. [03]
- OR**
- Que.5 (a) What is feedback? Explain the effect of negative feedback on input impedance and output impedance of an amplifier. [05]
 (b) Classify various types of feedback. [03]
- Que.6 (a) Discuss Colpitt's oscillator with suitable diagram. [05]
 (b) Why positive feedback is required in an oscillator? [03]
- OR**
- Que.6 (a) Explain positive feedback amplifier as an oscillator and write down Barkhausen criterion of oscillation. [05]
 (b) Draw the labeled circuit diagram for Wien bridge oscillator. [03]
- Que.7 (a) What is chromatic aberration? Discuss various types of chromatic aberration. [05]
 (b) Write a note on Curvature of field. [03]
- OR**
- Que.7 (a) What is an astigmatism? Discuss various methods used to minimize it. [05]
 (b) Write a note on distortion. [03]
- Que.8 (a) With suitable diagram, explain cardinal points and their planes of a co-axial lens system. [05]
 (b) A co-axial lens system placed in air has two lenses of focal lengths 20cm and 25cm separated by distance of 10 cm. Find the positions of the cardinal points. [03]
- OR**
- Que.8 (a) Explain in detail about Ramsden's eyepiece. [05]
 (b) Give any two comparisons of Huygens and Ramsden's eyepiece. [03]

