DY-003-1012002 Seat No. _____

B. Sc. (Sem. II) (CBCS) (W.E.F. 2016) Examination

April - 2022

Physics : Paper - 201

(Wave, Optics & Semiconductor Devices)

Faculty Code : 003

Subject Code : 1012002

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instruction : (1) Symbols and notations have their usual meaning.
(2) Total marks of the questions in indicate on the right side of the question.
(3) Attempt any five questions out of ten questions.

1 (a) Give answer to the followings questions : **4**
(1) _____ is audio frequency range.
(2) Define longitudinal wave.
(3) What is compration ?
(4) What is beats ?

(b) If intensity is increased by a factor of 20, by how many decibels is the sound level increased ? **2**

(c) State laws of Transverse vibrations of a string. **3**

(d) Explain standing wave and give difference between standing wave and travelling wave. **5**

2 (a) Give answer to the followings questions : **4**
(1) Define sound.
(2) What is wave motion ?
(3) What is nodes ?
(4) Define Transverse wave motion.

(b) The displacement of a particle of a string carrying a travelling wave given by **2**
$Y = (3\,\text{cm})\sin 6.28(0.50\times -50t\,(\text{sec.}))$ find amplitude, wavelength and frequency.

(c) Explain speed of sound in gas - Laplace's correction. **3**

(d) Explain Doppler Effect. **5**

3 (a) Give answer to the followings questions : 4

(1) What is rectification ?

(2) Define PIV ?

(3) Named the terminal of Transistor.

(4) Define output characteristics of CB connection.

(b) In a CB configuration current amplification factor is 0.9 if the emitter current is 1mA, determine the value of base current. 2

(c) Derive expression for root mean square value of current for half wave rectifier. 3

(d) Explain common emitter connection and derive relation between α and β. 5

4 (a) Give answer to the followings questions : 4

(1) How many diodes are use in center tapped full wave rectifier ?

(2) Define ripple.

(3) Define current amplification factor.

(4) Base is lightly doped terminal of transistor. (True/False)

(b) In a CE connection if $\beta = 50$ and $I_B = 25\mu A$, find emitter current. 2

(c) Prove that maximum efficiency of full wave rectifier is 81.2%. 3

(d) Explain all filter circuit in detailed. 5

5 (a) Give answer to the followings questions : 4

(1) What is wave front ?

(2) State Huygen's principle.

(3) What is interference ?

(4) Give types of interference.

(b) In a Newton's ring experiment the diameter of the 15^{th} ring was found to be 0.59 cm and that of the 5^{th} ring was 0.336 cm. If the radius of convex lense is 100 cm find the wavelength of light used. 2

(c) Describe condition for interference of light. 3

(d) In case of plane parallel thin film, discuss interference due to reflected light with condition for maxima and minima. 5

6 (a) Give answer to the followings questions : **4**

(1) Give types of wave front.

(2) Radii of N^{th} ring = $\sqrt{n\lambda R}$. (True/False)

(3) Give equation for fringe width.

(4) Give the principle of superposition of waves.

(b) A monochromatics light of wave length 5100A° is incident on a double slit. If the overall separation of 10 fringes on a screen placed 200 cm away is 2 cm find the slit separation in cm. **2**

(c) Derive the formula for the radius of Newton's rings. **3**

(d) What is Fresenel's biprism and give it's experimental arrangement and how wavelength of light determine using fresenel biprism ? **5**

7 (a) Give answer to the followings questions : **4**

(1) Define diffraction.

(2) Lenses are used in _____ diffraction.

(3) Zone plate acts as a converging lens. (True/False)

(4) What is plane difraction grating ?

(b) In zone plate of focal length 20 cm find the radius of second zone ? Wavelength of light is 5000A°. **2**

(c) Give difference between zone plate and convex lens. **3**

(d) What are Fresnel's zones and half period zones ? Show that the radii of all the zone are proportional to the square root of natural number and the area of all the half period zones are approximately equal. **5**

8 (a) Give answer to the followings questions : **4**

(1) Give formula for focal length of zone plate.

(2) A grating has 15000 lines/inch. Find grating elements in cm.

(3) Radius of first half period zone is _____.

(4) What is zone plate ?

(b) Find the radius of first zones of zone plate of focal length of 2m for wavelength 5000A°. **2**

(c) Explain types of diffraction. **3**

(d) Explain action of zone plate with necessary diagram. **5**

9 (a) Give answer to the followings questions : **4**

(1) What is polaroid ?

(2) State Brewster's law.

(3) The deviation produce for the _____ rays of light is maximum.

(4) The difference _____ is known as the mean dispersion.

(b) What is the polarizing angle of a medium of refractive index 1.732 ? **2**

(c) Explain dispersive power. **3**

(d) Write note on nicol prism. **5**

10 (a) Give answer to the followings questions : **4**

(1) Nicol prism made up from which material ?

(2) What is analyzer ?

(3) _____ is called the angular dispersion.

(4) Write Newton's formula.

(b) A beam of polarized light makes an angle of 60° with the axis of the polaroid sheet. How much is the intensity of light transmitted through the sheet ? **2**

(c) Explain Nodal points and Nodal planes. **3**

(d) What is Fermat's principle and derive laws of refraction using Fermat's principle. **5**
