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MBH-003-1012002 Seat No. _____

B. Sc. (Sem. II) (CBCS) Examination

March / April - 2018

Physics : Paper - 201

(New Course)

Faculty Code : 003

Subject Code : 1012002

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

Instructions : (1) Give answers of all the questions in given answer sheet.
(2) All questions are compulsory.
(3) Symbols have their usual meaning.
(4) Figure on the right hand side indicates full marks.
(5) Student can use non-programmable calculator.

1 (a) Answer following objective questions : **4**
(1 marks of each)
(1) The type of waves that carries sound in air is _____
(2) An equation for velocity of the wave on a string, for small amplitude is _____
(3) Audible waves have the frequency range of _____
(4) The speed of sound wave in a solid rod is given by an equation _____

(b) Answer any **one** question : **2**
(1) A steel wire of length 64 cm weights 5g. If it is stretched by force of 8N, what should be the speed of a transverse wave passing on it?
(2) Two trains are travelling towards each other both at a speed of 90 km/h. If one of the trains sounds a whistle at 500 Hz, what will be the apparent frequency heard in the other train? Speed of sound in air = 350m/s.

(c) Answer any **one** question : **3**

(1) Explain the velocity of waves on a string.

(2) Find the speed of sound in an aluminium, rod having the density of 2600 kg/m^3 and Young's modulus is 7.80×10^{10} N/m^2.

(d) Answer any **one** in detail : **5**

(1) Explain Standing waves in detail and give the difference between Standing waves and Travelling waves.

(2) Derive Newton's formula for velocity of sound in air and apply Laplace's correction.

2 (a) Answer following objective questions : **4**
(1 marks of each)

(1) The maximum efficiency of a half wave rectifier is _____

(2) The doping level of a Zener diode compared to crystal diode is more. (True/false)

(3) The region which has the biggest size in a transistor is _____

(4) For transistor, the relation between I_{CEO} & I_{CBO} is given by _____

(b) Answer any **one** question : **2**

(1) A power supply delivers 25 V dc with a ripple of 1 mV r.m.s. What is the ripple factor?

(2) In a common emitter configuration, if $\beta = 50$ and $I_B = 20\,\mu A$, calculate the value of emitter current.

(c) Answer any **one** question : **3**

(1) Define current gain α and β, find the reletion between them.

(2) In a bridge rectifier circuit, four diodes are used which has forward resistance of 1Ω and infinite reverse resistance. The alternative supply voltage is 240 V r.m.s. and load resistance is $480\,\Omega$ Find out I_{dc}.

(d) Answer any **one** in detail : **5**

(1) What is diode rectifier? Explain half wave rectifier with necessary circuit diagram.

(2) Explain CC transistor configuration in detail.

3 (a) Answer following objective questions : **4**
(1 marks of each)

(1) Newton's ring illustrates the phenomenon of _____

(2) A monochromatic light generally consists of single wave length. (True/false)

(3) In Lloyd's single mirror experiment, the fringe width is given by an equation, β = _____

(4) In Young's double slit experiment, interference occurs due to division of amplitude. (True/false)

(b) Answer any **one** question : **2**

(1) Newton's rings are observed in reflected light of wave length 6000 $\mathring{A}$. The diameter of 10^{th} dark ring is 0.50 cm. Find the radius of curvature of the lens.

(2) In a Young's double slit experiment, the separation between the slits is 0.10 mm, the wave length of light used is 600 nm and the interference pattern is observed on a screen 1.0 m away. Find the separation between the successive bright fringes.

(c) Answer any **one** question : **3**

(1) What is wave front? Give types of wave front.

(2) Draw a diagram for an experimental set up for Wedge-shaped thin film. (only Figure)

(d) Answer any **one** in detail : **5**

(1) What is Lloyd's Single mirror? How would you determine the wavelength of light with the help of Lloyd's Single mirror?

(2) In the case of plane parallel thin film, discuss the interference due to transmitted light also discuss the condition for Bright and Dark fringes.

4 (a) Answer following objective questions : **4**
(1 marks of each)

(1) In laboratory, we can observe _____ diffraction using two concave lenses.

(2) For Fraunhoffer diffraction at single slit, the width of the central maximum is proportional to the wavelength of the light. (True/false)

(3) The equation for the focal length of a zone plate is given by f_n = _____

(4) When waves encounter obstacles, they bend round the edge of it, called _____

(b) Answer any **one** question : **2**

(1) In a zone plate of focal length 30 cm, find the radius of second zone. Wavelength of light is 6000 $\overset{o}{A}$

(2) In Fraunhoffer diffraction pattern due to a narrow slit a screen is placed 2 m away from the lens to obtain the pattern. If the slit with is 0.2 mm and the first minima lie 5 mm on either sides of the central maximum then find the wavelength of light.

(c) Answer any **one** question : **3**

(1) Define diffraction. Explain type of diffraction.

(2) State difference between a zone plate and a convex lens.

(d) Answer any **one** in detail : **5**

(1) Discuss diffraction pattern of a straight edge.

(2) Explain Zone plate in detail.

5 (a) Answer following objective questions : **4**
(1 marks of each)

(1) Write Brewster law μ = _____

(2) The refractive index for the material of a prism is different for different wavelength. (True/false)

(3) The deviation corresponding to _____ colour is taken as mean deviation.

(4) Dispersive power, $\omega = \frac{\delta_R - \delta_V}{\delta}$ (True/false)

(b) Answer any **one** question : **2**

(1) Let lo be the intensity of polarized light. The angle between the axis of polarizer and the analyser is 60°. What will be the intensity of the light transmitted by the analyser?

(2) Find the angular dispersion produced by a prism for $A = 12^{\circ}, \mu_v = 1.664, \mu_r = 1.644$

(c) Answer any **one** question : **3**

(1) Explain Polarization by scattering.

(2) Find the dispersive power of flint glass, the refractive index of flint glass for red, yellow and violet light are 1.613, 1.620 and 1.632 respectively.

(d) Answer any **one** in detail : **5**

(1) Explain polarization by reflection and also explain Brewster's law and its application.

(2) Explain angular dispersion using ray optics and derive an equation for dispersive power.