



# Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL,  
2017

2018-19  
EXM/P/09/00

S. Y. B. Sc.  
PHS 202

School of Science  
Physics IV  
End Semester Examination  
PRN No.

Physics  
Semester – IV  
Max Marks: 20  
Student Sign. *2:30 PM to 3:00 PM*

*Tuesday 21st May 2019*  
Seat No.

Invigilator Sign.

Examiner Sign.

Marks Obtained

- Instructions:**
- 1) All Questions are compulsory.
  - 2) Mark  $\surd$  to the correct option. Do not circle.
  - 3) More than one options marked will not be considered for assessment.
  - 4) Rough calculations on paper are not allowed.
  - 5) Use non-programmable calculator is allowed.

Q.1	A)	Select correct alternative	Marks	Bloom's Level	CO
i)		When you have a wave packet, the speed of the entire packet is governed by the ----- velocity, while the speed of individual waves within it is governed by the ----- velocity. a) Group, Wave                      b) Wave, Group c) Group, Phase                      d) Phase, Wave	01	L1	202.1
ii)		Transverse waves are travelling along a string when the tension is increased to four times its original values. The velocity of the wave is -----. a) Double                                      b) Reduced to half c) Reduced to one fourth                      d) Reduced to three fourth	01	L1	202.1
iii)		Due to reverberation, a note of sound in a hall becomes ----- a) cut sharply    b) prolonged    c) short lived    d) harsh	01	L1	202.2
iv)		If actual surface area is S and its coefficient of absorption is $\alpha$ , the absorption A is given by ----- a) $A=\alpha S$ b) $S=\alpha A$ c) $AS=\alpha$ d) $A=S^\alpha$	01	L1	202.2

**ESE**

- v) In Fraunhofer type of diffraction, the incident and diffracted wavefronts are -----.
- a) spherical    b) plane    c) cylindrical    d) none of them
- 01            L1            202.3
- vi) Area of all half period zones -----.
- a) increases with n            b) decreases with n
- c) is the same            d) is zero
- 01            L1            202.3
- vii) To find prominent diffraction, the size of diffraction object should be -----.
- a) greater than wavelength of light used
- b) comparable to order of wavelength of light
- c) less than wavelength of light used
- d) none of these
- 01            L1            202.3
- viii) In Michelson's interferometer, interference is obtained by division of -----.
- a) wavefront    b) amplitude    c) both a) and b)    d) phase
- 01            L1            202.4
- ix) Newton's rings experiment is performed and radius is calculated. Now Plano-convex lens is replaced with another Plano-convex lens of greater Radius of curvature. What will be effect on radius?
- a) Radius will remain constant but there will be more brightness
- b) Radius will increase
- c) Radius will decrease
- d) There will be no effect
- 01            L1            202.4
- x) The condition for minimum of interference of light due to reflection at the surface of parallel faced glass plate is -----
- a)  $2\mu t \cos r = n\lambda$             b)  $2\mu t \cos r = \left(n + \frac{1}{2}\right)\lambda$
- c)  $2\mu t \cos r = \left(n + \frac{1}{2}\right)\frac{\lambda}{2}$             d) none of these

**ESE**

**B) Fill in the blanks**

- i) The phase velocity of a progressive wave is ----- 01 L1 202.1  
the velocity of the wave.
- ii) When piezoelectric crystal is stretched or compressed along 01 L1 202.2  
the mechanical axis, electric potential difference is produced  
along the ----- axis.
- iii) In Fresnel's type of diffraction, the source and the screen are 01 L1 202.3  
at ----- distances from the obstacle.
- iv) The central fringe in case of Newton's rings by reflected 01 L1 202.4  
light is -----.
- v) If (D) is the distance between the slits and the screen in 01 L1 202.3  
Young's double slit experiment, then fringe width ( $\beta$ )  
decreases with ----- in (D).

**C) State True or False**

- i) Lissajous figure at a 45 degree angle for two perpendicular 01 L1 202.1  
simple harmonic motions of same period means circle. -----  
-----
- ii) Ultrasonic waves suffer negligible diffraction, because their 01 L1 202.2  
wavelengths are very small.-----
- iii) For a given monochromatic light a zone plate has only one 01 L1 202.3  
focal length.-----
- iv) When a progressive wave gets reflected from the surface of a 01 L1 202.4  
denser medium, in the reflected wave there is introduced  
additional optical path of  $\lambda/2$ .-----
- v) When the light ray traverses from denser medium to rarer 01 L1 202.4  
medium, it refracts towards the normal.-----

**ESE**



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PHS 202

School of Science  
Physics IV

Physics  
Semester – IV  
Max Marks : 80

Tuesday 21 May 2019

End Semester Examination

3:00 pm to 5:30 pm

Instructions:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of logarithmic table and calculator are allowed.

Q.2	Answer the following questions	Marks	Blooms Level	CO
a)	Explain the superposition of two parallel simple harmonic motions of same period.	12	L2	202.1
b)	Obtain the differential equation of travelling wave on a stretched string.	4	L1	202.1

OR

b)	Obtain an expression for the frequency of second harmonic of a string.	4	L1	202.1
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Q.3	Answer the following questions	Marks	Blooms Level	CO
a)	i) Explain various factors affecting architectural acoustics and their remedies.	12	L2	202.2
	ii) State in brief various application of ultrasonics.			
b)	An auditorium of volume $1982 \text{ m}^3$ has a reverberation time 0.9 s when empty. Find the reverberation time when 250 persons are present in the auditorium. [Given: Absorption coefficient of a person = 0.4, average area of a person = $0.5574 \text{ m}^2$ ].	4	L3	202.2

OR

b)	Develop Fourier function for saw tooth wave form.	4	L3	202.2
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Q.4	Answer the following questions	Marks	Blooms Level	CO
a)	What is a zone plate? How it is constructed? Show that a zone plate acts as a convex lens by considering the source at infinity and a finite distance.	12	L3	202.3
b)	Discuss the Fraunhofer diffraction pattern shown by double slit.	8	L2	202.3

**OR**

b)	State and explain Huygen's principle. Explain construction of plane and spherical wavefront using Huygen's principle.	8	L2	202.3
c)	Find the radii of the first two elements of a zone plate, required to bring a parallel beam of light of wavelength 5000 Å to a focus 2 m away.	4	L3	202.3

Q.5	Answer the following questions	Marks	Blooms Level	CO
a)	Derive an expression for the optical path difference between two successively reflected rays of a monochromatic light, for a thin parallel-faced film. Hence, obtain the condition of maximum and minimum of interference.	12	L3	202.4
b)	Analyze the use of Michelson's interferometer in determination of the wavelength and wavelength difference of monochromatic light.	8	L4	202.4

**OR**

b)	Describe Fresnel's biprism. Explain how the wavelength of light can be determined with its help.	8	L4	202.4
c)	In a Newton's rings experiment, the diameters of the 6 <sup>th</sup> and 16 <sup>th</sup> rings were measured to be $3.35 \times 10^{-3}$ m and $6 \times 10^{-3}$ m respectively. If the radius of curvature of the plane convex lens is 100 cm. Calculate the wavelength of the light used.	4	L3	202.4

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