



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

2019-20
EXM/P/09/00

Year and Program:

School of Science

Department of Physics

2019-20, T.Y.B.Sc. (Physics)

Course Code – PHS315

Applied Optics

Semester – V

Day and Date – Tuesday
26-11-2019

End Semester Examination

Time: $\frac{1}{2}$ Hrs. 10.30 to 11.00
Max Marks: 20

PRN number –

Seat no-

Answer Booklet No.-

Students' Signature -

Invigilator's Signature –

section - A

Instructions:

- 1) All questions are compulsory.
- 2) Attempt Q.1 within first 30 minutes.
- 3) Each MCQ type question is followed by four plausible alternatives, Tick (\checkmark) the correct one.
- 4) Answer to question 1 should be written in the question paper and submit to the Jr. Supervisor.
- 5) If you tick more than one option it will not be evaluated.
- 6) Figures to the right indicate full marks.
- 7) Use Blue ball pen only.

Q.1	Select the correct alternative.	Marks	Bloom's Level	CO
a)	Specific rotation value for sugar is	01	L1	CO1
	i) 33° ii) 44° iii) 55° iv) 66°			
b)	At excited state electron stays for.....seconds.	01	L1	CO1
	i) 10^{-8} ii) 10^{-3} iii) 10^{-15} iv) 10^{-7}			
c)	In laser photons are amplified by the process of	01	L2	CO1
	i) absorption of radiation ii) spontaneous emission iii) stimulated emission iv) jumping			
d)	In case of positive crystal	01	L2	CO1
	i) $V_o > V_e$ ii) $V_o < V_e$ iii) $V_o = V_e$ iv) V_e is same in all direction			

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- e) In holography observer sees of an object. 01 L1 CO2
 i) virtual image ii) real image
 iii) short image iv) large image
- f) With holography we getimage of an object. 01 L1 CO2
 i) 2D ii) 3D iii) 1D iv) 0D
- g) Optical fiber is made up of ... 01 L1 CO2
 i) copper ii) nickel iii) zinc iv) plastic
- h) For total internal reflection to occur, angle of incidence at core cladding boundary should be greater than..... 01 L2 CO2
 i) critical angle ii) acceptance angle iii) 20° iv) 45°
- i) Diameter of core region is about 01 L2 CO2
 i) $50\ \mu\text{m}$ ii) 50 mm iii) 50 cm iv) 50 m
- j) In optical fiber refractive index ofis less than core. 01 L2 CO2
 i) sheath ii) cladding iii) launching end iv) aperture
- k) Condition for population inversion is 01 L2 CO1
 (i) $N_1 > N_2$ (ii) $N_1 < N_2$ (iii) $N_1 = N_2$ iv) none of these
- l) At metastable state electron stays for.....seconds. 01 L1 CO1
 i) 10^{-8} ii) 10^{-3} iii) 10^{-15} iv) 10^{-7}
- m)is example of negative crystal. 01 L1 CO1
 i) calcite ii) iron oxide iii) quartz iv) nickel
- n) Velocity of O ray is.....for any angle of incidence. 01 L2 CO1
 i) same ii) different iii) less iv) more
- o) Critical angle is the incident angle for which angle of refraction is..... 01 L2 CO2
 i) 45° ii) 90° iii) 180° iv) 270°
- p) The part of optical fiber through which light passes is called..... 01 L1 CO2
 i) sheath ii) core iii) cladding iv) aperture

- q) In optical fiber refractive index ofis greater than cladding. 01 L2 CO2
 i) sheath ii) core iii) glass iv) aperture 01 L2 CO2
- r) Formula for NA is 01 L2 CO2
 i) $NA = d \sin \theta$ ii) $NA = 2d \sin \theta$
 iii) $NA = 2 \sin \theta$ iv) $NA = \sin \theta$
- s) Numerical aperture is 01 L2 CO2
 i) sine of acceptance angle ii) sine of acceptance cone
 iii) sine of fractional index change iv) sine of critical angle
- t) Value of fractional index change is always..... 01 L4 CO2
 i) positive ii) negative
 iii) zero iv) both positive or negative

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Applied Optics

Semester – V

Day and Date – Tuesday
26-11-2019

End Semester Examination

Time: 2-5 hrs. 11 to 1-30

Max Marks: 80

PRN number –

Seat no-

Answer Booklet No.-

Students' Signature -

section - B

Invigilator's Signature -

Instructions:

- 1) All questions are compulsory.
- 2) Use of scientific calculator is allowed.
- 3) Figures to the right indicate full marks.

Q.2	Solve the following questions.	Marks	Bloom's	CO
			Level	
a)	Explain the terms spontaneous emission, pumping and meta stable state with the help of diagrams.	08	L5	CO1
b)	Distinguish between negative and positive crystals (any 6 points). Draw diagram for them.	08	L4	CO1
OR				
b)	i) Write a note on optical activity.	04	L2	CO1
	ii) Calculate specific rotation if plane of polarization is turned through 26.4° traversing 200mm length of 20 % sugar solution.	04	L5	CO1

Q.3.	Solve the following questions.	Marks	Bloom's	CO
			Level	
a)	i) A solution of dextrose has specific rotation 52.5° causes rotation of 12° in a column 10 cm long. Find the concentration of solution.	08	L5	CO1
	ii) A 20 cm length of solution when placed between crossed Nicols produces optical rotation of 13° . If the specific rotation of solution is 65° , then calculate the strength of the solution.			

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- b) What is double refraction? Explain the double refraction in case of Calcite crystal. 08 L5 CO1

OR

- b) Describe with the help of neat diagrams, the construction and working of Ruby Laser. 08 L2 CO1

Q.4 Solve the following questions.

**Marks Bloom's CO
Level**

- a) Explain the structure and cross sectional view of optical fiber. State any four applications of optical fibers. 12 L3 CO2
- b) Describe the recording and reconstruction of hologram. State any four applications of hologram. 12 L2 CO2

OR

- b) i) What will be the numerical aperture of an optical fiber cable with a clad index of 1.378 and a core index of 1.546? 04 L5 CO2
- ii) Explain the terms acceptance angle, acceptance cone with the help of neat diagrams. If Core and cladding have refractive indices 1.54 and 1.49 respectively find the critical angle. 08 L2 CO2

Q.5 Solve the following questions.

**Marks Bloom's CO
Level**

- a) i) State any eight advantages of optical fiber. Refractive indices of core and cladding are 1.46 and 1.44 respectively. Calculate numerical aperture and acceptance angle 12 L5 CO2

- b) i) Explain the types of optical fibers. 12 L6 CO2

OR

- b) i) Fiber core and cladding have refractive indices 1.546 and 1.378 respectively. Find critical angle. 04 L3 CO2

- ii) Explain the terms fractional refractive index change and numerical aperture. If in a fiber, fractional refractive index change is 0.0135 and N.A. is 0.2425, calculate refractive index of core and cladding. 08 L5 CO2

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