Total No. of Questions: 6

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Enrollment No.....



Faculty of Science End Sem (Odd) Examination Dec-2017 BC3CO12 Physics-III

Programme: B.Sc.(CS) Branch/Specialisation: Computer Science

Duration: 3 Hrs. Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 (M	(ICQs)	should be written in full instead of o	nly a, b, c or d.	
Q.1	i.	In Newton's ring arrangement the proportional to	e diameter of rings found is	1
		(a) λ (b) λ^2	(c) $\lambda^{1/2}$ (d) λ^3	
	ii.	Two sources of light are said to be them have the same	coherent if waves produced by	1
		(a) Wavelength	(b) Amplitude	
		(c) Constant phase difference	(d) Frequency	
	iii.	The condition for obtaining Fraund slit is that the light waveform incident	_	1
		(a) Spherical (b) Cylindrical	(c) Elliptical (d) Plane	
	iv.	Angular width of central maxima single slit does not depend upon (a) Distance between slit and source		1
		(c) Width of the slit	(d) Frequency of light used	
	v.	When a plane polarised light is inc with its vibrations making an angle emergent light is:	cident on a quarter wave plate	1
		(a) Elliptically polarized	(b) Plane polarized	
		(c) Circularly polarized	(d) None of these	
	vi.	Polarisation of light proves the (a) Corpuscular nature of light (b) Quantum nature of light	` '	1
		(c) Transverse nature of light		

(d) Longitudinal wave nature of light

P.T.O.

	vii. Which one of the following plane transmission grating of wide and number of line per cm N will have the maximum resolution.			1
		power in the first order		
		(a) $e = 1 \text{ cm}, N = 5000$	(b) $e = 1.5cm$, $N = 4000$	
		(c) $e = 2cm$, $N=2400$	(d) e=3cm, N=1500	
	viii.	The criterion of resolution of optical		1
		(a) Newton (b) Huygen	(c) Rayleigh (d) Ramsden	
	ix.	The directionality of a laser beam is	measured by	1
	(a) Visibility of interference fringes		•	
		(b) The size and aperture of laser source		
		(c) The divergence angle of the bean	n	
		(d) Nature of the lasing medium		
	х.	The laser used in cancer treatment is		1
		(a) Ruby laser	(b) He-Ne laser	
		(c) Nd-Yag laser	(d) CO ₂ laser	
•	i.	Discuss the important condition for t	the interference of light.	3
	ii.	Describe Newton's ring method for measuring the wave length of		
		monochromatic light. Give the neces	ssary theory.	
OR	iii	Describe Michelson's interferometer	and explain the formation of	7
		circular and straight fringes with it.		
Q.3	i.	What is meant by diffraction of	light? Distinguish between	3
		Fresnel and Fraunhoffer classes of diffraction.		
	ii.	Describe Fraunhofer diffraction due	e to a single slit and deduce	7
		the position of maxima and minima.		
OR	iii.	Give the construction and theory of	of plane transmission grating	7
		and explain the formation of spectra	by it.	
Q.4	i.	Explain Brewster's law. Show from	n this law that when light is	4
		incident on the transparent substa	_	
		reflected and refracted rays are right	• •	
	ii.	Describe the construction and working	ng of Nicol prism.	6
OR	iii.	Describe the phenomenon of double	refraction in uniaxial crystal.	6
		How is it explained by Huygen's the	ory.	

Q.5	i.	Write the expression of resolving power of grating and show how can the resolving power of grating be increased?	2
	ii.	The diameter of objective of telescope is 2.54cm. Calculate the resolving limit and resolving power of telescope for the light of wavelength 5000A°.	3
	iii.	Explain the meaning of optical rotation and rotatory dispersion and state the laws of optical rotation.	5
OR	iv	What is meant by the resolving limit of telescope. Deduce expression for it.	5
Q.6	i.	What is an optical pumping? Explain it in detail taking a case of three level lasing system.	3
	ii.	What are Einstein's coefficient A and B? Derive Einstein's relation between them.	7
OR	iii.	Draw a neat diagram of He-Ne laser and describe its method of working.	7

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Marking Scheme

Q.1	i.	In Newton's ring arrangement the diameter of rings found is proportional to (a) λ	1
	ii.	Two sources of light are said to be coherent if waves produced by them have the same	1
	iii.	(c) Constant phase difference The condition for obtaining Fraunhofer diffraction from a single slit is that the light waveform incident on the slit should be (d) Plane	1
	iv.	Angular width of central maxima of a diffraction pattern of a single slit does not depend upon (a) Distance between slit and source	1
	v.	When a plane polarised light is incident on a quarter wave plate with its vibrations making an angle 45° with the optic axis, the emergent light is: (c) Circularly polarized	1
	vi.	Polarisation of light proves the (c) Transverse nature of light	1
	vii.	Which one of the following plane transmission grating of width e and number of line per cm N will have the maximum resolving power in the first order (b) e = 1.5cm, N = 4000	1
	viii.	The criterion of resolution of optical instruments was given by (c) Rayleigh	1
	ix.	The directionality of a laser beam is measured by (c) The divergence angle of the beam	1
	х.	The laser used in cancer treatment is (d) CO ₂ laser	1
Q.2	i. ii.	Each condition of 1 mark (1 mark * 3 = marks) 2 marks for fig setup 3 marks for theory 2 marks for fringes & theory figures.	3 7

OR	iii	2 marks for figure	7
		3 marks for theory	
		2 marks for fringes	
Q.3	i.	1 marks for diffraction of light	3
		At least 2 differences $(1 \text{ mark} * 2 = 2 \text{ marks})$	
	ii.	4 marks for Fraunhofer diffraction due to a single slit	7
		3 marks for deduce the position of maxima and minima.	
OR	iii.	1 mark for Construction of plane transmission	7
		3 marks for theory of plane transmission grating	
		3 marks for formation of spectra by it.	
Q.4	i.	1 mark for Brewster's law	4
		3 marks for proving the law with condition.	
	ii.	3 marks for construction	6
		3 marks for working of Nicol prism.	
OR	iii.	3 marks for phenomenon of double refraction in uniaxial crystal	6
		3 marks for Huygen's theory.	
Q.5	i.	1 mark for resolving power formula	2
		1 mark for reason	
	ii.	1.5 marks for resolving limit 2.4 * 10 ⁻⁵	3
		1.5 marks for resolving power $4.17 * 10^4$	
	iii.	2 marks for meaning of optical rotation and rotatory dispersion	5
		3 marks for laws of optical rotaion.	
OR	iv	2 marks for resolving limit of telescope	5
		3 marks for deduce expression for it.	
Q.6	i.	1 mark for optical pumping	3
		2 marks for the case of three level lasing system	
	ii.	2 marks for Einstein's coefficient A and B	7
		5 marks for Einstein's relation between them.	
OR	iii.	2 marks for the diagram of He-Ne laser	7
		5 marks for its method of working.	
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