07/08_EP-II_FE_Sem II (R-19)_Inst Name

University of Mumbai

Sub_PART-B

1. Q1

	Solve any Three out of Four	(5 marks each)
A	A plane transmission grating having 5500 lines per cm is used to obtain a spectrum of light from sodium light in the second order. Find the angular separation between the two sodium lines whose wavelengths are 5890A^0 and 5896A^0 respectively.	
B	Explain pumping and population inversion in laser action. Describe how those are taking place in He-Ne laser with neat labelled diagram.	
C	i)What is curl of a vector field? Express it in Cartesian coordinate system. ii) Determine the 'curl' of a vector field $\vec{A} = \hat{\imath}(2x^2 + y^2) + \hat{\jmath}(xy - y^2)$ at the point (1,2,2)	
D	i) Why electron microscope is considered better than optical microscope in characterization of nanomaterials? ii) Describe the working of a Scanning Electron Microscope (SEM) with diagram.	

Files submitted:

2.   Q2

	Solve any Three out of Four	(5 marks each)
A	Define resolving power of a grating? Show that the resolving power depends on the number of slits in the grating and the order of the spectrum.	
B	A step index fiber is made with a core of index 1.52, a diameter of 29μm and a fractional difference index of 0.0007. It is operated at a wavelength of 1.3μm. Find the fiber 'V' number and the number of modes the fiber will support.	
C	State and derive the Maxwell's equation which describes how the electric field circulates around time varying magnetic field. (In differential form)	
D	i) Distinguish between inertial frame of reference and non-inertial frame of reference. ii) An event occurs at x= 150m, y=20m, z=10m and t= 1x 10^{-4} s in a frame S. Find the co-ordinates of this event in a frame S' which is moving with a velocity 2.5 x 10^8 m/s with respect to the frame S along the common XX' axes using Galilean transformation.	

Files submitted:

3.   Have you uploaded the required correct files *

Mark only one oval.

◯ Yes

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