Paper / Subject Code: 29712 / Engineering Physics - II

FE Sem II (R-2019 C scheme) "All Branches" Dec'2023
15/12/2023

Time: 2 Hours **Maximum Marks: 60**

i Question number 1 is compulsory

ii Attempt any three questions from Q2 to Q6

iii Assume suitable data wherever required

iv Figures to the right indicate full marks for that question

QN	Question	Marks
Q1	**Attempt any five out of six (3 marks each)**	15
A	What do you mean by resolving power of diffraction grating ?What is it's significance ?	
B	What is population inversion in Laser system ? What is it's Significance ?	
C	An optical fibre refractive index 1.48 and 1.41 respectively of core ,clad Calculate i) Critical angle ii) Numerical Aperture iii) Maximum Incidence angle	
D	Find the divergence of a Vector field $\vec{F} = 4x\,\hat{\imath} + 2y\,\hat{\jmath} + 3z\,\hat{k}$	
E	Calculate the velocity of a particle at which it should move so that its mass will increase by 25% of its rest mass.	
F	What are nanomaterials & what are their different types	
Q2	**Attempt all questions**	15
A	What is plane transmission Grating ? Explain its spectral response A plane transmission Grating has 5000 lines/cm. i) Determine the Highest order of spectrum observed if incident light is having wavelength of 6010 Å°ii) If the opaque spaces between the slits are made three times the transparent space and the maximum order is three , Find which order of spectra will be absent .	8
B	With neat and labelled diagrams explain the construction and working of a Nd-Yag laser.	7

6D576F744238FF5D143156C96D1D766A

15

Q3 **Attempt all questions**

A What are Galilean transformations? Obtain transformation equations for coordinate, velocity and acceleration. 8

B Explain the term 'curl of a vector and state its significance'. Show that the divergence of the curl of a vector is zero. 7

15

Q4 **Attempt all three questions (5 marks each)**

A What do you understand by resolving power? How can the resolving power of a grating be increased? Find maximum resolving power of a grating of width 3 cm, illuminated by a laser beam of wavelength 6000 Å° having 6000 lines per cm.

B What is the divergence of a vector field? Find the divergence of a field $F = xz\,\hat{i} + y^2z^3\,\hat{j} - xyz\,k$ at a point (3, -1,2). Interpret the result you obtain.

C With a neat labelled diagram explaining the construction and working of an Scanning electron microscope. (SEM)

15

Q5 **Attempt all three questions (5 marks each)**

A Obtain Ampere's circuital law for static magnetic field in differential and integral form

B What is time dilation? Express it mathematically. The length of a moving rod is found to be one fourth of its length when at rest. What is the speed of the rod relative to the observer?

C What is Holography ? With neat diagram explain reconstruction process of a hologram.

15

Q6 **Attempt three questions (5 marks each)**

Write short Notes on

A Application of fibre optics in communication

B Applications of Nano technology in various fields

C Applications of Lasers in industry

****

6D576F744238FF5D143156C96D1D766A