Q. Paper Code:
22FY103103

D.Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY
KASABA BAWADA KOLHAPUR-416006
(An Autonomous Institute)
F. Y. B. Tech
END SEMESTER EXAMINATION, APRIL-2022.
Course Name: Engineering Physics Course Code: 201GEL103

Seat No:

Day and Date: Monday, 11/04/2022
Time: 10.00 am to 1.00 pm **Max. Marks- 100**

Instructions:

i. Figure to the right indicate **full marks**.
ii. **Assume standard data**, whenever necessary
iii. Use of **non-programmable** calculator is allowed.
iv. **Given**: - Charge on electron (e)= 1.6×10^{-19} C, Mass of proton= 1.67×10^{-27} Kg

BT	CO's	Q. No.	Statement of Question	Marks
		Q.1	**Attempt the following questions.**	**40**
L2	103.1	**A**	(i) Derive an Expression for Resolving Power of diffraction grating to diffract light from slit.	6
L2	103.1		(ii) Derive the path difference between interfering waves for plane parallel thin film.	4
L3	103.1		(iii) A Parallel beam of light is allowed to be incident normally on a plane diffraction grating having 5000 lines per cm. The second order spectral line is observed to be deviated through 30^o.Calculate the wavelength of spectral line. **OR** iii) How many orders will be visible if the wavelength of the incident light is 5000Å and the number of lines per inch on the grating is 2620.	3
L2	103.2	**B**	(i) Derive the Differential equation for Damped SHM and find solution for it.	6
L2	103.2		(ii) Discuss any 5 properties of Ultrasonic wave, in detail.	4
L3	103.2		(iii) A piezoelectric crystal has a length of 4×10^{-3} m and density 3×10^3 kg/m^3. Calculate its fundamental frequency. (Y= 8.2×10^{10} N/m^2) **OR** (iii) Calculate the thickness of a quartz plate needed to produce ultrasonic waves of frequency 2MHz. (Density of quartz = 2650 kg/m^3, Y= 8×10^{10} N/m^2)	3
L2	103.3	**C**	(i) Discuss the variation of fermi energy with temperature for p and n type semiconductor with neat labelled diagram.	6
L2, L3	103.3		(ii) Locate the fermi energy in n type semiconductor band diagram and find its value	4
L3	103.3		(iii) In Hall coefficient experiment, a current of 0.25 A is sent through a metal strip having thickness 0.2mm and width 5 mm. Hall voltage is	4

BT	CO's	Q. No.	Statement of Question	Marks
			found to be 0.15mV when a magnetic field of 0.2 T is used. Calculate carrier concentration passing through metal strip. **OR** (iii) In solid, consider the energy lying 0.012 eV above fermi level. What is the probability of this level being occupied by an electron at 300K	
		Q.2	**Attempt any Four of the following questions**	**20**
L2	103.3	**A**	Derive the expression for De-Broglie wavelength of matter waves and express it into two different forms.	5
L2	103.3	**B**	Derive the expression for Schrödinger time independent wave equation.	5
L3	103.3	**C**	Calculate the energy difference between ground state and first exited state of an electron in one dimensional potential well of length 10^{-8}cm.	5
L3	103.3	**D**	Calculate the values of energy of an electron on a one-dimensional box with impenetrable walls of length 1Å.	5
L2	103.3	**E**	Derive an expression for energy of a particle confined in one-dimension potential box when particle is confined in a box.	5
		Q.3	**Attempt any Four of the following questions.**	**20**
L2	103.4	**A**	Find the maximum acceptance angle for optical fibre for the propagation of light.	5
L1	103.4	**B**	Discuss the following terms with labelled diagram, Absorption of photons, Stimulated emission and Population inversion.	5
L3	103.4	**C**	**(i)** Find the Numerical aperture and acceptance angle of a step index fibre with core refractive index 1.40 and Δ =0.02.	3
			(ii) An optical fibre refractive index of core and cladding are 1.53 and 1.42 respectively. Calculate its critical angle.	2
L2	103.4	**D**	Discuss emission of laser from the energy level diagram and resonant energy transfer mechanism in He-Ne laser.	5
L3	103.4	**E**	An optical fibre has core refractive index n_1=1.36 and the fractional refractive index Δ = 0.025. Find the (i) refractive index of cladding (ii) acceptance angle	5
		Q.4	**Attempt the following questions.**	**20**
L2	103.4	**A**	Explain High energy Ball milling method for the preparation of nanoparticles.	7
L1, L2	103.4	**B**	What is nanomaterial? Explain Colloidal method technique used for synthesis of nanomaterials.	7
L2	103.4	**C**	Discuss in detail, properties of nanomaterials. **OR** Discuss the engineering, medical, defense and research applications of nanomaterials.	6

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