Lovely Professional University, Punjab

Subject: **Engineering Physics (PHY110) (B.Tech)** **Set-B**

Time: 60 mins **Class Test-I** **Total Mark-30**

(All questions are compulsory)

1. a). What is divergence of a vector field in Cartesian coordinates and explain its physical significance. [5x3=15]

   b). State Stoke's theorem and write it's mathematical expression.

   c). Sketch the vector field $F = -x\hat{i} + y\hat{j}$ at (-2, -1), (2, -1) and (-2, 1)

   d). Distinguish between spontaneous emission and stimulated emission of radiation.

   e). What is pumping process? Give one example of 4-level Laser.

2. What are the FOUR differential forms of Maxwell's equation and explain its physical significance. [5]

3. Show that the vector field is given by $\vec{F} = yz\hat{i} + xz\hat{j} + xy\hat{k}$ is solenoidal. [5]

4. If S is any closed surface enclosed a volume 'V' and $\vec{F} = 10x\hat{i} - 5y\hat{j} + 5z\hat{k}$, show that
$$\iint_s \vec{F}.\overrightarrow{ds} = 10V$$ [5]

Q1 Consider a vector field $\bar{A} = 3y^2 z^2 \bar{i} + 3x^2 z^2 \bar{j} + 3x^2 y^2 \bar{k}$ (i) Show that field is solenoidal	6	
Q2. Derive First and 3rd Maxwell equations in differential form and write its physical significance.	6	
Q3. Discuss construction and working of Nd-YAG Laser with suitable energy level diagram.	6	
Q4. Define (a)metastable state (b)population inversion (c) stimulated emission	6	
Q5. What is the principle of Holography? Explain the processes : recording and reconstruction with suitable block diagram	6	

Subject : PHY 110   SET A (odd Roll nos.)   M.M: 6x5 = 30

Q1. State Gauss's law for magnetic field. What is its physical interpretation?

. Q2. What is equation of continuity? How could Maxwell correct and present Ampere's law   in its generalized form?

Q3. What are Einstein's coefficients? Derive Einstein relation between them

Q4. What is the principle of laser? Discuss how Gas laser is different from Solid-state laser.

Q5. Define the following terms.
   (a) Population inversion (b) Active medium c) Stimulated emission

Q6. If $f(x, y, z) = 3x^2y - yz^2$, find grad f at point $(1, 2, -1)$.

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Subject : PHY 110   SET B (even Roll nos.)   M.M: 6x5 = 30

Q1 A vector field is given by $A = yz\,\hat{i} + xz\,\hat{j}\ xy\,\hat{k}$. Show that it is solenoidal.

Q2. Discuss with suitable diagrams the principle, construction and working of solid-state laser

Q3. If $f(x, y, z) = 3x^2y - yz^2$, find grad f at point $(1, 2, -1)$.

Q4). Define Laser. What are the various applications of laser?

Q5. What is equation of continuity? How could Maxwell correct and present Ampere's law in its generalized form?

Q6). Define Stimulated emission and then Derive Einstein relation between A_{21} & B_{21}.

M.M: 6x5 = 30

Subject : PHY 110   **SET A (odd Roll nos.)**

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Q1:Consider a vector field $\vec{A} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$
 	
  (i)   Show that field is solenoidal
  (ii)   Calculate curl of field A.
	6	

Q2. Derive 4th Maxwell equation in differential form and write its physical significance.	6	
Q3. Discuss construction and working of He-Ne Laser with suitable energy level diagram.	6	
Q4. Define (a)metastable state (b)population inversion (c) stimulated emission	6	
Q5. Derive continuity equation.	6	