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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year I Semester Examinations, March/April - 2023
ENGINEERING PHYSICS
(Common to CE, ME, MCT, MMT, AE, MIE, PTM, TTE)

Time: 3 Hours   **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
　　　ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
　　　iii) In Part B, Answer any one question from each unit. Each question carries 10 marks
　　　　　and may have a, b as sub questions.

PART – A
(25 Marks)

1.a)	What are the laws of friction?	[2]
b)	Explain transformations of vectors.	[3]
c)	Q of a sonometer wire is 2×10^3. On plucking, it executes 240 vibrations per second. Calculate the time in which the amplitude decreases to $1/e^2$ of its initial value.	[2]
d)	Give the important characteristics of simple harmonic motion.	[3]
e)	What are acoustics waves?	[2]
f)	State the laws of transverse vibration of strings?	[3]
g)	What is a diffraction grating?	[2]
h)	Write working principle of an interferometer.	[3]
i)	What is a role of cladding in an optical fibre?	[2]
j)	Distinguish between stimulated and spontaneous emissions.	[3]

PART - B
(50 Marks)

2.a) With the help of a neat diagram deduce the equation for velocity of a body in terms of polar coordinate system.
　b) Give an account of forces in nature.　　　　　　　　　　　　　　　　　　[6+4]

OR

3.a) Write a short note on cylindrical and spherical coordinates.
　b) Express equation of motion in cylindrical and spherical coordinates.　　　[6+4]

4.　What are damped oscillations? Obtain differential equation for damped oscillations and mention the conditions for underdamped, criticallydamped and overdamped cases. [10]

OR

5.a) What are the forced oscillations? Establish differential equation for it and write the general solution of this differential equation.
　b) Define quality factor of a damped harmonic oscillator and obtain expression in terms of relaxation time.　　　　　　　　　　　　　　　　　　　　　　　　　[6+4]

6. What are the transverse waves? Obtain an expression for the frequency of vibration in a stretched string. [10]

OR

7. Write a note on harmonic, transmission and reflection waves at a boundary. [10]

8.a) Describe the experimental arrangement to observe Newton's rings by reflected light. Obtain an expression for the diameters of nth bright and dark rings.
   b) Discuss interference of light due to wave front division. [6+4]

OR

9.a) Explain the single slit Fraunhofer diffraction. Obtain the conditions for maxima and minima.
   b) State and explain superposition theorem. [6+4]

10.a) Explain the principle of an optical fiber. Classify optical fibers based on their refractive index profile.
   b) Discuss the various applications of optical fibers. [6+4]

OR

11.a) Explain the construction and working of the He-Ne laser with a neat energy level diagram.
   b) Write applications of lasers in medical field. [6+4]

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