R18

Code No: 151AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, October/November - 2020
ENGINEERING PHYSICS
(Common to CE, ME, MCT, MMT, AE, MIE, PTM)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) A vector 'A' in two dimensional coordinate system. If the cartesian coordinate system is rotated in anticlock wise direction through an angle θ and the new coordinate system. Express the relation between x and y components of vector A in the new and old coordinate systems. Derive the relation with the help of a diagram.

b) A block of 100 N is placed on an inclined plane having inclination of 30^0 with horizontal. A force of 75 N is required to move it up along the direction of the plane. Find co-efficient of friction between the block and plane. [7+8]

2. Derive the equation for acceleration of a body in terms of cylindrical co-ordinate system. Explain in stepwise with neat diagram. [15]

3.a) Using the equation of motion of the damped forced harmonic oscillator, derive an expression for its amplitude in the steady state.

b) The quality factor of a tuning fork is 5×10^4. Calculate the time interval after which its energy becomes 1/10 of its initial value. The frequency of the fork is 300 sec^{-1}. [10+5]

4.a) Establish correspondence between the impedance of electric oscillator and impedance of mechanical oscillator.

b) Express quality factor of a damped harmonic oscillator in terms of relaxation time.[10+5]

5. Show that length of string equals half integral wavelengths in case of standing waves produced in the string clamped at both ends. [15]

6. Show that reflection coefficient of amplitude and transmission coefficient of amplitude are independent of frequency of a stretched string at discontinuity. [15]

7.a) Derive the expression for the diameter of the n^{th} dark ring in Newton's ring interference pattern. With necessary equations explain briefly the experimental procedure to determine the refractive index of a liquid.

b) In Newton's ring experiment the diameter of the 15^{th} dark ring was found to be 0.590cm and that of the 5^{th} dark ring 0.336cm. If the radius of the plano convex lens is 100cm, calculate the wavelength of the light used. [10+5]

8.a) What is a plane diffraction grating? Describe a method to determine wavelength of light using it.

b) What is the highest order spectrum, which may be seen with monochromatic light of wavelength 600nm by means of a diffraction grating with 5000 lines/cm? [10+5]

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