# THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI 625 015.

## Department of Physics

## Assignment –I

| Course Code | 23PH120 | Course Name | PHYSICS | | |
|---|---|---|---|---|---|
| Degree | B.Tech | Programme | IT | Semester | |
| Du Date | 31/10/2023 | Duration | | Max. Marks | 40 |
| Faculty-in-Charge | | Dr.A.L.Subramaniyan | | | |

**Answer All Questions**

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| 1 | Prove that the efficiency of an ideal heat engine depends only on the temperature of the source and sink.(5marks) | CO3 |
| 2 | Compute the change in entropy when 5 kg of water at 100ºC is converted into steam at the same temperature. (Latent heat of vaporisation=540cal/g) .(2 marks) | CO3 |
| 3 | One mole of a gas expands isothermally to four times its volume. Calculate the change in entropy in terms of gas constant.(3 marks) | CO3 |
| 4 | A particle starts from rest and its acceleration is given as 5-10t m/s$^2$.Find the position and velocity of the particle at a time,t=1s.<br><br>Hence plot the graph of acceleration with time ,velocity with time and displacement with time (7 marks) | CO1 |
| 5 | A vector is represented by4i+ 5 j. If the xy frame is rotated by 60,find the components of vector in the new frame and magnitude of vector in both frames.( 3 marks) | CO1 |
| 6 | The polar coordinates (r,θ) are given by (e$^t$,12t) .Find the magnitude of velocity and acceleration at t=0s.( 3 marks) | CO1 |
| 7 | A particle is confined to move in a 1D box of width 1nm.Find the first three energy .levels for the particle and draw the energy level diagram. Hence plot the wave function and probability density function for first three energy levels (7 marks) | CO2 |
| 8 | Compute the momentum and de-Broglie wavelength of an electron at a potential of 100KV. If the error in momentum is 10 percent of its value, compute the error in position.(5 marks) | CO2 |
| 9 | A particle is limited to the x axis has the wave function $\psi(x)$ =1.731x between x=0 and x=1, $\psi(x)$ =0 elsewhere. Find the expectation value of the particle's position ( 3 marks) | CO2 |
| 10. | Assuming the placement data that 10 students were placed with 16 LPA ,30 students were placed with 15 LPA ,4 students with 18 LPA , 1 student with 23LPA , 15 students with 9 LPA compute the expectation value of salary with respect to number of students.( CLASSICAL EXPECTATION) (2 marks)<br>LPA-LACS PER ANUM | CO2 |
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