|  |  |  |  |
| --- | --- | --- | --- |
| Image result for adamas university logo | **ADAMAS UNIVERSITY**  **END SEMESTER EXAMINATION**  (Academic Session: 2020 – 21) | | |
| **Name of the Program:** | B.Tech. | **Semester:** | I |
| **Paper Title:** | Applied Science | **Paper Code:** | SAS41101 |
| **Maximum Marks:** | 50 | **Time Duration:** | 3 Hrs |
| **Total No. of Questions:** | 17 | **Total No of Pages:** | 2 |
| *(Any other information for the student may be mentioned here)* | 1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. 3. Assumptions made if any, should be stated clearly at the beginning of your answer. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Group A**  **Answer All the Questions (5 x 1 = 5)** | | | |
|  |  | **Knowledge Level** |  |
| 1 | What do you mean by vector quantity? | **RE** | **CO1** |
| 2 | What is damped harmonic motion? | **RE** | **CO1** |
| 3 | Define Interference of light. | **RE** | **CO2** |
| 4 | *C*P-*C*V=nR is true for all gases. Justify or criticize. | **AN** | **CO4** |
| 5 | What is the unit of rate constant for 1st order chemical reaction? | **Understanding** | **CO5** |
| **Group B**  **Answer All the Questions (5 x 2 = 10)** | | | |
| 6 a) | Explain Stokes theorem in vector analysis. | **UN** | **CO1** |
| **(OR)** | | | |
| 6 b) | Explain divergence theorem in vector analysis. | **UN** | **CO1** |
| 7 a) | Apply the knowledge of vector calculus and find the angle between the vectors A=3i +4j +5k and B=3i + 4j – 5k. | **AP** | **CO1** |
| **(OR)** | | | |
| 7 b) | Apply the knowledge of vector calculus and find the angle between the vector 4i + 3j + 5k with X-axis. | **AP** | **CO1** |
| 8 a) | Define Simple Harmonic Motion and establish the differential equation of it. | **RE**  **UN** | **CO1** |
| **(OR)** | | | |
| 8 b) | State the characteristic of a Simple Harmonic Motion. | **RE** | **CO1** |
| 9 a) | Define intrinsic and extrinsic properties with suitable examples. | **Remembering** | **CO4** |
| **(OR)** | | | |
| 9 b) | What is the trend of *C*p ₋ *C*v value for solid, liquid, ideal and real gas? Justify. | **Analysing** | **CO4** |
| 10 a) | Reaction 1 and 2 are each 1st order, and rate constant *k*1>*k*2 at certain temperature. Then the rate *r*1>*r*2. Justify or criticize. | **Analysing** | **CO5** |
| **(OR)** | | | |
| 10 b) | What are the characteristics of zero order chemical reaction? | **Understanding** | **CO5** |
| **Group C**  **Answer All the Questions (7 x 5 = 35)** | | | |
| 11 a) | 1. What is coherence? 2. What are the condition for producing sustained interference pattern? | **RE** | **CO2** |
| **(OR)** | | | |
| 11 b) | 1. What is wave fronts? 2. Explain different types of wave fronts. 3. Discuss about Huygen’s principle. | **RE**  **UN**  **Creating** | **CO2** |
| 12 a) | 1. What is electromagnetic induction? 2. State Faraday’s law and find it’s differential form. | **RE** | **CO3** |
| **(OR)** | | | |
| 12 b) | 1. Write down Maxwell’s equation. 2. From these equations identify Gauss’s law, Ampere’s law and Faraday’s law. | **RE**  **AN** | **CO2** |
| 13 a) | Establish the differential equation of Simple Harmonic Equation and solve the equation. | **Creating** | **CO3** |
| **(OR)** | | | |
| 13 b) | Prove that the energy of a particle executing simple harmonic motion is constant. | **EV** | **CO3** |
| 14 a) | (i) Show that for one mole of perfect gas Cp- Cv =R 3  ii) Justify the Statement ‘Entropy of the Universe is increasing’. 2 | Understanding  Evaluating | **CO4** |
| **(OR)** | | | |
| 14 b) | (i) An ideal monoatomic gas (one mole) is heated from 27oC to 227oC and volume expanded from 10 liter to 100 liter. What is the change in molar entropy? 3  ii) Explain thermodynamics criteria for spontaneity of process. 2 | Remembering  Understanding | **CO4** |
| 15 a) | i) A first order reaction is never completed—Explain. 2  ii) How the activation energy of a reaction be calculated when rate constant is doubled and temperature is increased from 300K to 310K? 3 | Understanding  Evaluating | **CO5** |
| **(OR)** | | | |
| 15 b) | i) What is pseudo first order reaction? 2  ii) A first order reaction is 50% complete in 20 minutes at 27OC and in 5 minutes at 37OC. Find out the reaction rate constant at 27OC and the energy of activation of the reaction. 3 | Remembering  Evaluating | **CO5** |
| 16 a) | 1. Define curl of a vector. Give its Physical significance. 2. State Stokes theorem. 3. If find . | **RE**  **EV** | **CO1** |
| **(OR)** | | | |
| 16 b) | 1. Define divergence of a vector. 2. State Gauss’s divergence theorem. 3. Show that is a conservative force field. | **RE**  **EV** | **CO5** |
| 17 a) | 1i).56 g of nitrogen gas was initially at 50 atm and 250C.The gas is allowed to expand isothermally against a constant external pressure of one atmosphere. Calculate ∆E, ∆H, q and W, assuming the gas to be a perfect gas  ii) If the gas expands reversibly under isothermal condition at one atmosphere, what will be the maximum work?  ii) What do you mean by reversible and irreversible process? |  | **CO5** |
| **(OR)** | | | |
| 17 b) | i) Define the terms open, closed and isolated systems  ii) Derive an expression for work done in isothermal reversible expansion of an ideal gas |  | **CO5** |