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| **UT/MAQP/1223/A 6-NOV-2023** | | | | | | | | | | |
| **UNIT TEST – (2023-24)** | | | | | | | | | | |
| **Subject: MATHEMATICS**  **Grade: 12** | | | | | Max. Marks:50Time:2 hours 30 min | | | | | |
| ***General Instructions***:   1. ***This Question paper contains - five sections A, B, C, D and E. Each section is compulsory.*** 2. ***Section A has 8 MCQ’s and 02 Assertion-Reason based questions of 1 mark each.*** 3. ***Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.*** 4. ***Section C has 4 Short Answer (SA)-type questions of 3 marks each.*** 5. ***Section D has 2 Long Answer (LA)-type questions of 5 marks each.*** 6. ***Section E has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.*** | | | | | | | | | | |
| **SECTION A** (Each question carries 1 marks) | | | | | | | | | |
| **1.** | The integrating factor of the equation | | | | | | | | |
|  | **a** | log(1+ | **b** |  | | **c** |  | **d** | 1+ |
| **2.** |  | | | | | | | | |
|  | a | x +c | b | x +c | | c | x +c | d | +c |
| **3.** | The solution set of the inequality 2x+3y >6 is | | | | | | | | |
|  | a | An open half plane not containing the origin | b | And open half plane containing the origin | | c | The whole xy plane not containing the line 2x+3y=6 | d | a closed half plane containing the origin |
| **4.** | If ‘p’ and ‘q ‘are the degree and order of the differential equation . Then the value of 2p-3q is | | | | | | | | |
|  | **a** | **1** | **b** | **2** | | **c** | **-1** | **d** | **-4** |
| **5.** | If and is a vector such that = and , then is equal to | | | | | | | | |
|  | **a** | (a) | **b** | **7** | | **c** |  | **d** | **3** |
| **6.** | The projection of the vector  on the vector   is | | | | | | | | |
|  | **a** |  | **b** |  | | **c** |  | **d** |  |
| **7.** | Solution of when y(0)=1 is given by | | | | | | | | |
|  | **a** | **xy= -** | **b** | **xy= -** | | **c** | **xy= -1** | **d** | **Y=2** |
| **8.** | Evaluate | | | | | | | | |
|  | **a** | **1** | **b** | **0** | | **c** |  | **d** |  |
|  | **ASSERTION- REASON BASED QUESTIONS**  In the following questions statement of assertion (A) is followed by a statement of (R). Choose the correct answer out of the following choices.  (a) Both A and R are true, and R is the correct explanation of A  (b) Bothe A and R are true, but R is not the correct explanation of A.  (c) A is true but R is false  (d) A is false but R is true. | | | | | | | | |
| 9. | Assertion (A): - | x-1 | + 3 is defined for all real values of x except x = - 1.  Reason (R): Maximum value of f(x) is 3 and Minimum value does not exist. | | | | | | | | |
| 10. | Assertion (A): = log +C, where C is a constant of Integration.  Reason (R): = log+C, where C is the constant of Integration | | | | | | | | |
| **SECTION B (2 marks each)** | | | | | | | | | |
| 11. | Evaluate: | | | | | | | | |
| 12. | Using integration, find the area of the region bounded by the line x-y+2=0 and the curve and the y axis. | | | | | | | | |
| 13. | If be a unit vector | | | | | | | | |
| 14. | Find the Integrating factor: (1+tany) (dx- dy) +2xdy=0 | | | | | | | | |
| 15. | Solve the differential equation: | | | | | | | | |
| **SECTION C** ( 3 marks each) | | | | | | | | | |
| 16. | Using integration find the area of the region included between the parabola  and the line  x + y=2. | | | | | | | | |
| 17. | Solve the differential equation | | | | | | | | |
| 18. | Evaluate | | | | | | | | |
| 19. | Find the vector of magnitude units that are perpendicular to the plane of vectors and. | | | | | | | | |
| **SECTION D**  ( Each Question carries 5 marks ) | | | | | | | | | |
| 20 | Evaluate : dx | | | | | | | | |
| 21 | Solve the following Linear Programming problem graphically:  Maximize Z=8000x+12000y subject  to the constraints 9x+12y | | | | | | | | |
| **SECTION E**  ( ***Case study based questions of 4 marks each with two sub parts .Case study questions have three sub parts (i) (ii) (iii) of marks 1,1,2 respectively.*** | | | | | | | | | |
| 22. | ***Case Study 1***: Ritika starts walking from his house to shopping mall. Instead of going to the mall directly, she first goes to the ATM, from there to her daughter’s school and then reaches the mall. In the diagram A(1,1,1), B(-2,4,1), C (-1,5,5)and D(2,2,5) represent the coordinates of the House, ATM, School and Mall respectively.  **A diagram of a diagram of a person and a building  Description automatically generated**  i) Find the distance between House A and School C.  ii)Find the unit vector along BD.  iii) Find the area of the triangle formed by ABD. | | | | | | | | |
| 23 | A butter cookies company designs a metal box as shown below. The metal box with a square base and vertical sides is to contain 1024 𝑐𝑚3. The material for the top and bottom costs ₹ 5 per 𝑐𝑚2 and the material for the sides costs ₹ 2.50 per 𝑐𝑚2.  A cube with arrows and lines  Description automatically generated with medium confidence  Based on the above information answer the following:   1. If 𝑥 represents the side of the square base and 𝑦 the length of the vertical sides, then the relation between the variables 2. Express the cost of making the metal box C as a function of 𝑥. 3. Find the least cost of the metal box. | | | | | | | | |

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