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| **UT/MAQP/1223/B 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 6 Short Answer (SA)-type questions of 3 marks each.* 5. *Section D has 4 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.** | In which of the following differential equations is the degree equal to its order . | | | | |
|  | **a** | = 0 | | **b** |  |
|  | **c** |  | | **d** |  |
| **2.** | The feasible region corresponding to the linear constraints of a Linear Programming Problem is given below.    Which of the following is not a constraint to the given Linear Programming Problem? | | | | |
|  | a |  | | **b** |  |
|  | c |  | | **d** |  |
| **3.** | Find the value of | | | | |
|  | a | 0 | | b | 1/2 |
|  | c | 1 | | d | 4 |
| **4.** | Find the integrating factor of the differential equation | | | | |
|  | **a** | **-x** | | **b** | **1/x** |
|  | **c** | **-1/x** | | **d** |  |
| **5.** | Find | | | | |
|  | **a** | +C | | **b** | +C |
|  | **c** |  | | **d** | +C |
| **6.** | Find the particular solution of Cos( | | | | |
|  | **a** | **Y =** | | **b** | **Cos** |
|  | **c** | **Y =** | | **d** | **y =** |
| 7 | The projection of the vector 2𝑖̂+ 3𝑗̂-2𝑘̂ on the vector 𝑖̂+2 𝑗̂+ 𝑘̂ is | | | | |
|  | **a** |  | | **b** |  |
|  | **c** |  | | **d** |  |
| 8 | If | | | | |
|  | **a** |  | | **b** | **37** |
|  | **c** |  | | **d** |  |
|  |  |  | |  |  |
|  | **ASSERTION- REASON BASED QUESTIONS**  In the following questions statement of assertion (A) is followed by a statement of Reason (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): f( x) attains local minima at x= 1where f(x) = x3-3x  Reason (R): x=c is a point of local minima if and | | | | |
| 10. | Assertion (A):.  Reason (R): | | | | |
| **SECTION B (2 marks each)** | | | | | |
| 11. | Solve the following differential equation : | | | | |
| 12. | **If** | | | | |
| 13. | Solve the following differential equations: | | | | |
| 14. | Find the area bounded by the curve y = x and the ordinates x = -1 and x =1 | | | | |
| 15. | Evaluate: dx | | | | |
| **SECTION C** ( 3 marks each) | | | | | |
| 16. | Using integration find the area of the region included between the parabola y2=2x and the line  x – y = 4. | | | | |
| 17. | If  **, and . Find a vector**  **which is perpendicular to both and** | | | | |
| 18. | Evaluate : | | | | |
| 19. | Solve the differential equation = | | | | |
| **SECTION D**  ( Each Question carries 5 marks ) | | | | | |
| 20 | Evaluate : | | | | |
| 21 | Solve the following Linear Programming problem graphically:  Maximize Z=600x+400y  Subject to the constraints x+2y≤12 , 2x+y≤12 ,4x+5y≤20 , x≥0;y≥0 | | | | |
| **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***: Three slogans on a chart papers are to be placed on a school bulletin board at points A, B and C displaying A( Hub of Learning ),B( Creating a better world for tomorrow ) and C ( Education come first ).The co ordinates of these points are A( 1,4,2) ,B( 3,-3,-2)  C(-2,2,6)     1. If are position vectors of the points A,B and C respectively ,then find      1. Find the unit vector along AC. 2. Find the area of the triangle formed by ABC. | | | | |
| 23 | ***Case Study2:*** A tin can manufacturer designs a cylindrical tin can for a company making sanitizer and disinfector. The tin can is made to hold 3 litres of sanitizer or disinfector    Based on the above information answer the following:   1. If r cm be the radius and h cm be the height of the cylindrical tin can, then express   h in terms of r .   1. Express the surface area as a function of r   Find the radius that will minimize the cost of the material to manufacture the tin can | | | | |

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