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| **PB1/MAQP/1223/B 27-NOV-2023** | | | | | | |
| **PRE-BOARD EXAMINATION - I (2023-24)** | | | | | | |
| **Subject: Mathematics**  **Grade: XII** | | | Max. Marks:80Time:3 hr | | | |
| **Name:** | | | | | **Section:** | **Roll No:** |
| *General Instructions*:   1. *This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.* 2. *Section A has 18 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 of 4 marks each. with sub-parts.* | | | | | | |
|  | **Section –A**  (Multiple Choice Questions)  Each question carries 1 mark | | | | | |
|  |  | | | | | |
|  | **a.** | 1 | | **b.** | ½ | |
|  | **c.** | 2 | | **d.** |  | |
| **2.** | If A is a square matrix, then A+AT= \_\_\_\_\_\_\_\_\_ | | | | | |
|  | **a.** | Unit matrix | | **b.** | Null Matrix | |
|  | **c.** | Symmetric matrix | | **d.** | Skew-symmetric matrix | |
| **3.** | If A= | | | | | |
|  | **a.** | A | | **b.** | 2A | |
|  | **c.** | -A | | **d.** | 3A | |
| **4.** | A= | | | | | |
|  | **a.** | 0 | | **b.** | 1 | |
|  | **c.** | 2 | | **d.** | 3 | |
| **5.** |  | | | | | |
|  | **a.** |  | | **b.** |  | |
|  | **c.** |  | | **d.** |  | |
| 6. | Consider the function f(x)=  If f(x) is continuous at x=a, then k=\_\_\_\_\_\_ | | | | | |
|  | **a** | a | | **b** | Cosa | |
|  | **c** | tana | | **D** |  | |
| 7. | If xy=ex-y  then | | | | | |
|  | **a** |  | | **b** |  | |
|  | **c** |  | | **d** |  | |
| 8. | If A and B are square matrices of order 3 such that | | | | | |
|  | **a** | -9 | | **b** | -27 | |
|  | **c** | -81 | | **d** | 81 | |
| 9. | If A= | | | | | |
|  | **a** |  | | **b** |  | |
|  | **c** |  | | **d** |  | |
| 10. | If | | | | | |
|  | **a** |  | | **b** |  | |
|  | **c** | =1 | | **d** | None of these | |
| 11. | A line makes | | | | | |
|  | **a** |  | | **b** |  | |
|  | **c** | or | | **d** |  | |
| 12. | Let ; and . If the projection of is 1. Then | | | | | |
|  | **a** | 1 | | **b** | 2 | |
|  | **c** | 3 | | **d** | 4 | |
| 13. | The sum of the order and degree of the differential equation | | | | | |
|  | **a** | 3 | | **b** | 5 | |
|  | **c** | 4 | | **d** | 6 | |
| 14. | The integrating factor of the differential equation | | | | | |
|  | **a** | x | | **b** |  | |
|  | **c** |  | | **d** |  | |
| 15. | The corner points of the feasible region determined by the set of constraints are P (0,5) ,Q(3,5), R(5,0),and S(4,1) and the objective function Z=ax+2by where a , b>0. The condition on a and b such that the maximum Z occurs at Q and S is | | | | | |
|  | **a** | a-5b=0 | | **b** | a-3b=0 | |
|  | **c** | a-2b=0 | | **d** | a-8b=0 | |
| 16. | Which of the following is not a constraint to the given Linear Programming Problem? | | | | | |
|  | **a** | x+2y | | **b** | 2x+y | |
|  | **c** | 2x-y | | **d** | x, y | |
| 17. | If the lines are mutually perpendicular, then k = \_\_\_\_\_ | | | | | |
|  | **a** |  | | **b** |  | |
|  | **c** | -10 | | **d** | 7 | |
| 18. |  | | | | | |
|  | **ASSERTION-REASON BASED QUESTIONS**  In the following questions, a 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) Both (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. | | | | | |
| 19. | R: Q x Q, where Q is the set of all rational number and R is defined as R=  ASSERTION (A): R is an equivalence relation.  REASON (R): R is an equivalence relation iff R is reflexive, symmetric and transitive | | | | | |
| 20. | x (log  ASSERTION (A):  REASON (R): log b a cb= log c a | | | | | |
|  | **Section –B**  [This section comprises of very short answer type questions (VSA) of 2 marks each] | | | | | |
| 21. | Evaluate  **OR**  Find the domain of Sin-1(x2-2) | | | | | |
| 22. | For the curve y=5x-2x3. if ‘x’ increases at the rate of 2 units/see, then how fast in the slope of the curve changing when x=3. | | | | | |
| 23. | Find the intervals in which the function f(x) given by f(x)= is increasing | | | | | |
| 24. | Find the maximum value of  **OR**  Find the value of x a company can make maximum profit if the profit function given by  P(x)= , where x is the number of items and P is the profit in Rupees | | | | | |
| 25. | Find the value of | | | | | |
|  | **Section – C**  [This section comprises of short answer type questions (SA) of 3 marks each] | | | | | |
| 26. | **OR**  Integrate | | | | | |
| 27. | Evaluate | | | | | |
| 28. | Find the particular solution of the differential equation  at x=1.  **OR**  Solve Given x=0 when y=1 | | | | | |
| 29. | Solve given that x=0 when y= | | | | | |
| 30. | If y= | | | | | |
| 31. | Solve the following Linear Programming Problem graphically:  Maximize Z=600x+400y subject to the constraints.  x+2y  **OR**  Solve the following Linear Programming Problem graphically:  Minimize Z=x+2Y , subject to the constraints X+2Y | | | | | |
|  | **Section – D**  [This section comprises of long answer type questions (LA) of 5 marks each] | | | | | |
| 32. | Show that the function f: R is neither one-one nor onto  OR  Determine whether the relation R defined by the set R of all real numbers as  R= is reflexive ,symmetric and transitive? | | | | | |
| 33. | If A=.Solve the system of equation x-2y=10; 2x-y-z=8; and -2y+z=7  OR  If A= find AB. Hence solve the system of equation  x-y=3; 2x+3y+4z=17; y+2z=7 | | | | | |
| 34. | Using Integration, find the area of the region bounded by the curve y= | | | | | |
| 35. | A line passing through the point A with position vector is parallel to the vector . Find the length of the perpendicular drawn on this line from a point P with position vector . | | | | | |
|  | **Section –E**  This section comprises of 3 case- study/passage-based questions of 4 marks each with sub parts. The first two case study questions have three sub parts (i), (ii), (iii) of marks 1,1,2 respectively.  The third case study question has two sub parts of 2 marks each.) | | | | | |
| 36. | The flight path of two airplanes is shown below. Airplane 1 has a layover in B and proceeds to C and Airplane 2 has a layover in D and proceeds to C. The vector along , are ‘4, and 7’ as shown in the figure.  See related image detail. Unseen Tours: exploring London with the homeless - Every Steph   1. Given that AX = λ AC then find AX in terms of a, b and λ, 2. Given that DX = μ DB Express DX in terms of a, b and μ 3. Find the value of λ and of μ with the given information | | | | | |
| 37. | These are the Deadliest Highways in Texas – Texas Monthly Motorcyclist Podcast Episode 10, 2021 - AFT’s Michael Lock | Motorcyclist  Two motorist A and B running at the speed more than the allowed speed along the line L1 and L2 whose equations are given respectively as and   1. Find the direction cosines of the line L1. 2. Express the equation of Line L2 in Vector form. 3. Check whether the motorists travel on these two directions have a chance to collide (express your answer with reason) | | | | | |
| 38. | A diagram of a circle with lines and letters  Description automatically generated  The school wishes to honor the students by giving badges for their achievement, they instruct the vendor that badge should be made of thin sheet metal, consisting of two semi-circular pieces, center’s B and C, each of radius ‘x’ cm. They are attached to each other by a rectangular piece of thin sheet metal, ABCD, to mention the achievement such that AB and CD are the radii of the semicircular pieces and AD = BC = y cm.   1. If the area of the badge is 20cm2, Express the perimeter, P cm, of the badge in terms of x. 2. Given that x can vary, find the minimum value of P, justifying that this value is a minimum. | | | | | |

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