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| **B** | | |
| **HY/MA/1220B 12/11/2020** | | |
| **HALF YEARLY EXAMINATION (2020-21)** | | |
| **SUBJECT: MATHEMATICS**  **GRADE: XII** | | **MAX MARKS: 80**  **TIME: 3 Hours** |
| ***General Instructions:*** | | |
| **PART A**  **SECTION 1**  **All questions are compulsory. In case of internal choices , attempt any one.** | | |
| 1 | Find the value of *p*, such that the matrixis singular. | |
| 2 | Find , if | |
| 3 | Find the order and degree of differential equation:  **OR** | |
| 4 | Find x, if . | |
| 5 | If A and B are invertible matrices of order 3, and . Find | |
| 6 | Determine the value of ‘k’ for which the following function is continuous at x = 3 .  f(x) = | |
| 7 | Find the integrating factor of the following differential equation: | |
| 8 | Find **OR** Evaluate: | |
| 9 | Evaluate | |
| 10. | Find the slope of the tangent to the curve at the point (2, -1)  **OR**  If tangent to the curve at the point (h, k) is the parallel to the line x-y = 4, then find the value of ‘k’ | |
| 11 | Find | |
| 12 | If A is a square matrix such that , then find the value of . | |
| 13 | Find | |
| 14 | Find the derivative of ) | |
| 15 | Find | |
| 16 | If then find | |
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|  | **Section II**  **Both the Case Study based questions are compulsory. Attempt any 4 sub parts from each question 17 and 18. Each question carries 1 mark.** | |
| 17  (i) | An open-topped box is to be made by removing squares from each corner of a rectangular piece of card and then folding up the sides. The original rectangular card measures 45 cm by 24 cm, and the squares removed from the corners have sides x cm long.  The volume of the box is given by | |
| ii) | Write an expression for the surface area of the box   1. (b) (c) (d) | |
| (iii) | The value of x which makes the volume of the box maximum is   1. b) (c) (d) | |
| (iv) | The maximum volume of the box is   1. (b) (c) (d) | |
| (v) | How much cardboard is required to cover the box on top ?   1. 850 sq cm (b) 715 sq cm (c) 490 sq cm (d) 960 sq cm | |
| 18 | The figure shows the metal box with square base of side x cm and height ‘h’ cm. Its volume is  1024 . The material for the top and the bottom costs Rs 5/ and the material for the sides costs Rs 2.50/. | |
| i) | The surface area of the box is given by  (a) 2 b) 4 (c) (d) 4 | |
| (ii) | The cost (C ) of the box is given by  (a) 2 b) 4 (c) (d) 10 | |
| (iii) | The value of x at which C is minimum  (a) 4 (b) (c) (d) | |
| (iv) | Value of ‘h’ when C is minimum  (a) 40mm (b) 16 cm ( c) 64 cm (d) 0.8 m | |
| (v) | The least cost is:  (a)1280 rupees (b)1920 rupees ( c)2560 rupees (d)3200 rupees | |
|  | **PART B**  **Section III** | |
| 19 | Evaluate OR Evaluate | |
| 20 | Find the integral**:** | |
| 21 | Find the values of x for which the function, is increasing in R | |
| 22 | If P is the adjoint of 3 × 3 matrix A and |A| = 4, then find α .  **OR**  Evaluate the determinant | |
| 23 | Solve the differential equation . | |
| 24 | Solve: | |
| 25 | Find if | |
| 26 | Find the area of the region bounded by the curve and the line x = 3 | |
| 27 | If , then find | |
| 28 | Find the area enclosed between the ordinates x= -1 & x= 1 and the line y = x | |
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| **Section IV** | | |
| 29 | If then find | |
| 30 | Find | |
| 31 | If A = prove that | |
| 32 | If prove that  **OR**  If , then prove that | |
| 33 | Find the equation (s) of the tangent(s) to the curve at the points , where the curve intersects the X- axis | |
| 34 | Find the equation of a curve passing through origin and satisfying the given differential equation: | |
| 35 | Find the particular solution of the differential equation: | |
| **Section V** | | |
| 36 | Given two matrices and, and. Find and use this result to solve the following system of equations: , , .  **OR**  Solve the following system of equations by matrix method:  x – y +2z =7  2x – y + 3z =12  3x + 2y – z = 5 | |
| 37. | Evaluate **OR** | |
| 38 | Find the area of the following region using integration:  **OR**  Using the method of integration, find the area of the triangle ABC, coordinates of whose vertices are A(2,-2) B(4,5) and C(6,2). | |

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