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| **HY/MA/1220A 11/11/2020** | | |
| **HALF YEARLY EXAMINATION (2020-21)** | | | |
| **Subject: MATHEMATICS**  **Grade: XII** | | Max. Marks: 80Time: 3 Hrs | |
| ***General instructions:***  1. This question paper contains two **parts A and B**. Each part is compulsory. Part A  carries **24** marks and Part B carries **56** marks  2. **Part-A** has Objective Type Questions and **Part -B** has Descriptive Type Questions  3. Both Part A and Part B have choices.  **Part – A:**  1. It consists of two sections**- I and II**.  2. Section **I** comprises of 16 very short answer type questions.  3. Section **II** contains **2** case studies. Each case study comprises of 5 case based MCQs. An examinee is to attempt **any 4 out of 5 MCQs**.  **Part – B:**  1. It consists of three sections**- III, IV and V.**  2. Section **III** comprises of 10 questions of **2 marks** each**.**  3. Section **IV** comprises of 7 questions of **3 marks** each**.**  4. Section **V** comprises of 3 questions of **5 marks** each**.**  5. Internal choice is provided in **3** questions of Section –III, **2** questions of Section-IV and **3** questions of Section-V. You have to attempt only one of the alternatives | | | |
|  | **PART- A** | | |
|  | **SECTION I** | | |
| 1 | Find the maximum and minimum of the function  OR  Find the value of if the functions cut orthogonally. | | |
| 2 | Find the derivative of ) | | |
| 3 | Determine the value of ‘k’ for which the following function is continuous at x = -1. | | |
| 4 | Find: | | |
| 5 | Write the sum of the order and degree of the D.E | | |
| 6. | dx **OR** | | |
| 7. |  | | |
| 8. | If the matrix is symmetric. Find the value of x-y-z | | |
| 9. | Find the integrating factor for the differential equation: .  OR  Find the integrating factor for the following Differential equation, | | |
| 10. | If is singular. Find x? | | |
| 11. | If y= . Find | | |
| 12 | Differentiate w.r.t x | | |
| 13. | If f(1)=4,and w.r.t. x at x=0 | | |
| 14. | Evaluate: | | |
| 15. | If P is the adjoint of 3 × 3 matrix A and |A| = 4, then find α | | |
| 16. | If A is a square matrix of order 3 and | | |
|  | **SECTION- II**  Both the Case study-based questions are compulsory. Attempt any 4 sub parts from each question (17-21) and (22-26). Each question carries 1 mark | | |
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| 17 | The backyard greenhouse in the figure below uses plastic tubing for framing and plastic sheeting for wall covering. The end walls are semicircles, and the greenhouse is built to the dimensions in the figure below. All walls and the floor are covered by the plastic sheeting. The door is formed by cutting a slit in one of the end walls. | | |
|  | i) Write an expression for the length(l) of the plastic tubing needed to make the green house? (r be the radius of the semi-circular part and h be the length of the floor)   1. b)   c) d) | | |
|  | ii) Write an expression for the quantity of plastic sheeting required to cover the top, sides, and floor of the greenhouse?   1. b)   c) d) | | |
|  | iii) If the volume of the green house is V cubic units find the expression for the volume in terms of the radius of the semi-circular portion of the green house.  a) b)  c) d) | | |
|  | iv) which of the following equation represents  a) b)  c) d) | | |
|  | v) Find the relation between radius and height of the green house when the area is maximum  a) b)  c) d) | | |
| 18. | An architect is designing a window in the form of a rectangle surmounted by a semicircular opening. The total perimeter of the window is 14 m. If r is the radius of the semicircular portion and b be the width of the rectangular portion | | |
|  | 1. Find an expression for perimeter of the window   a) b)  c) d) | | |
|  | 1. Area of the window in terms of r only   b)  c) d) | | |
|  | 1. The dimensions of the window to allow maximum sunlight through the whole opening   b)  c) d) | | |
|  | 1. Find the area of the window to allow maximum sunlight?   b) c) d) | | |
|  | 1. The cost of construction of the window if the rate per is 8 Rs.   b) c) d) | | |
|  | **PART- B** | | |
|  | **SECTION III** | | |
| 19. | Find , if | | |
| 20. | Evaluate.  OR  Evaluate | | |
|  |  | | |
| 21. | Solve the following differential equation | | |
| 22. | If A= . Find the value of ‘k’ so that . Hence find  **OR**  If A= find where | | |
|  |  | | |
| 23. |  | | |
| 24. | Find whether the following function is differentiable at x=2 or not. f(x)= | | |
| 25. | Find the area bounded by the curve and the line | | |
| 26. | Determine whether the function is increasing or decreasing for all | | |
| 27. | Find the particular solution for the differential equation given that y=0 when x=1 | | |
| 28. | Find the area bounded by the line y=x, the X-axis and the lines x = -1 and x = 2 | | |
|  | **SECTION IV** | | |
| 29 | If and , find | | |
| 30 | Solve the differential equation: | | |
| 31 | If  then show that  OR  prove that | | |
| 32 | Find the equations of the tangents and normals to the curve and at | | |
| 33 | Find the general solution for this differential equatioon | | |
| 34 | Evaluate | | |
| 35 | If A =,find A | | |
|  | **SECTION V** | | |
| 36 | Evaluate  **OR** | | |
| 37 | If A= Find  Solve the system of linear equations  **OR**  A = B = Find the product AB and use it to solve the equations | | |
| 38. | Find the area of the region included between the parabola 4y=3x2 and the line.  **OR**  Using integration find the area of the region bounded by the lines | | |

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