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**PB/MA/1220/A 18/01/2021**

**PREBOARD EXAMINATION (2020-21)**

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| **SUBJECT: MATHEMATICS**  **GRADE: XII** | **MAXIMUM MARKS: 80****TIME ALLOWED: 3 HOURS** |
| **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 in all such questions. | |

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| **PART– A** | |
| **SECTION I**  **All questions are compulsory. In case of internal choice attempt any one.**  **Each question carries 1 mark** | |
| **1.** | Let A = { 1,2,3} , B = { 4,5,6,7 } and let f = { ( 1,4) , ( 2, 5) ,( 3, 6) } be a function from A to B .State whether f is one-one or not  **OR**  If R = { (x,y) : x+ 2y = 8 } is a relation on N , write the range of R |
| **2.** | If , write the cofactor of the element a **23** |
| **3.** | Let R be the equivalence relation in the set A = { 0,1,2,3,4, 5 } given by R = { (a,b) : 2 divides (a-b) } Write the equivalence class [ 0]  **OR**  Let A = { 1,2,3,..9} and R be the relation in A x A defined by (a,b) R (c,d) in A x A. Find the equivalence class [( 2, 5 )] |
| **4.** | Write the reason for the relation R in the set {1,2,3} given by R = { (1,2) , ( 2,1) } not to be transitive |
| **5.** | If A = , then what is the value of A ( Adj A)  **OR**  If = the value of a – 2b |
| **6.** | Write the direction cosine of the following line x = -3, = |
| **7.** | Evaluate:  **OR**  Evaluate**:** |
| **8.** | Write the value of the following + ) + |
| **9.** | If m and n are the order and degree, respectively of the differential equation  y ( ) 3 + ) 2 – xy = Sinx , then write th value of m + n  **OR**  Find the product of the order and degree of the following differential equation.  X( |
| **10.** | A bag contains 5 white, 3 red and 2 green balls. Four balls are drawn one by one from the bag without replacement, what is the probability of drawing no white ball |
| **11.** | Find the equation of the line through A ( 1,-1,5) and parallel to the line |
| **12.** | Find the projection of the vector on the vector |
| **13.** | Write a unit vector in the direction of the vectors and = 2 |
| **14.** | Find the area under the curve y = and the lines x =1 , x= 2 and x -axis |
| **15.** | If A and B are events such that P ( A ) = , P ( B) = and P ( A , then find  P ( not A and not B) |
| **16.** | For what value of x , if the matrix A= a skew symmetric matrix |
|  | **SECTION II**  **Both the Case study based questions are compulsory. Attempt any 4 sub parts from each question (17-18). Each question carries 1 mark** |
| **17.** | A package is in the shape of a cuboid and has a length Lcm , width w cm and height 12 cm ,if the volume of the box is 2400 .The package is tied up using a red string that fits exactly around the package in two different directions as shown in the figure.    Using the given information answer the following questions |
| (i) | The length of the string x is given by  a) x = 12 + 4 w + b) x = 24 + 4 w +  c) x = x = 12 + 4 w + d) x = 24+ 4 w + |
| (ii) | Find  a) 4 + b) 4 -  c) 4 + d) None of these |
| (iii) | Find the value of w when x is minimum  a) w = 10 b) w = 100  c) w= 24 d) None of these |
| (iv) | Find the value of l( length of cuboid) , of the package for when X is minimum  a) 400 b) 40  c) 20 d)104 |
| (v) | What is the condition for the length to be minimum  a) b)  c) d) |
| **18.** | A coach training 3 players .He observes that the player A can hit a target 4 times in 5 shots , player B can hit 3 times in 4 shots and player C can hit 2 times in 3 shots.  Based on this information answer the following questions |
| **(i)** | Let A be the target hit by A , B be the target hit by B and C be the target hit by C. Then the probability that A, B and C all will hit is  a) b) c) d) |
| **(ii)** | Referring to (i) , what is the probability that B , C will hit and A will loose  a) b) c) d) |
| **(iii)** | With reference to the events mentioned in (i) , what is the probability that any two of A , B and C will hit  a) b) c) d) |
| **(iv)** | What is the probability that ‘none of them will hit the ‘target ‘  a) b) c) d) |
| **(v)** | What is the probability that A, B will hit and C will lose?  a) b) c) d) |
|  | **PART – B** |
| **SECTION III**  **Each question carries 2marks** |
| **19.** | Find the derivative of f ( with respect to x at x = 0. It is given that |
| **20.** | Find a matrix A such that 2 A – 3 B + 5 C = O , where B = and C =  **OR**  If x and y are 2 x 2 matrices, then solve the following matrix equations for X and Y :  2 X + 3 Y = , 3 X + 2 Y= |
| **21.** | Evaluate : tan-1[2 cos(2 sin-1)] |
| **22.** | Write a unit vector perpendicular to both the vectors and |
| **23.** | If , find the value of a  **OR** |
| **24.** | If a plane meets the coordinate axes in points A,B C and the centroid of the triangle ABC is  ( find the equation of the plane |
| **25.** | Find the general solution of differential equation |
| **26.** | Find the slope of the tangent to the curve y = at the point whose x coordinate is 2 |
| **27.** | Find the area of the region bounded by , and the lines x = 1 , x = 4 and the x-axis in the first quadrant |
| **28.** | The probabilities of two students A and B coming to the school in time are and respectively .Assuming that the events ‘A coming in time ‘ and ‘B coming in time’ are independent , find the probability of only one of them coming to school in time  **OR**  A couple has 2 children. Find the probability that both are boys, if it is known that at least one of them is a boy |
|  | **SECTION IV**  **All questions are compulsory. In case of internal choice attempt any one**  **Each question carries 3 marks** |
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| **29.** | Let f: R+🡪[4,∞) given by f(x) = x2 + 4. Show that f is invertible with the inverse f-1of f given by  f-1(y) = , where R+ is the set of all non-negative real numbers. |
| **30.** | Find the equations of the tangent and the normal , to the curve at the point ( where |
| **31.** | Find whether the function is differentiable or not at x =2  f(x) =  **OR**  If y=log(1+2t2+t4); x = , find |
| **32.** | Show that the differential equation is homogeneous and also solve it |
| **33.** | Evaluate : |
| **34.** | Using integration, find the area of the region in the first quadrant enclosed by the x-axis , the line y = x and the circle x2+ y 2 = 32  **OR**  Using integration find the area of the region included between the parabola and the line x + y=2 |
| **35.** | If , then find |
| **SECTION V**  **All questions are compulsory. In case of internal choice attempt any one**  **Each question carries 5 marks** | |
| **36.** | B=Find AB and use the product to solve the system of equations x-y+ 2z =1 ; 2y – 3z = 1; 3x-2y+4z =2  **OR**  If A= Find  Solve the system of linear equations |
| **37.** | Find the distance of the point (-2, 3,-4) from the line == measured parallel to the plane 4x + 12y - 3z + 1 = 0.  **OR**  Prove that the line through A (0,-1,-1) and B (4,5,1) intersects the line through C(3,9,4) and D(-4,4,4)? Find the point of intersection P and hence find the equation of the plane contain P, A and C? |
| **38.** | Solve the following linear programming problem (LPP) graphically  .Minimize Z = 5x + 10 y  Subject to constraints ;  x + 2y  **OR**  Solve the following linear programming problem (LPP) graphically  Maximum the value of Z = 2x + 5y ,  subject to constraints given below  2x+ 4y |

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