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

**PREBOARD EXAMINATION (2020-21)**

**MATHEMATICS –XII**

**Marking scheme (Theory)**

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| **Section I**  **All questions are compulsory. In case of internal choice attempt any one.**  **Each question carries 1 mark** | | **Marks** |
| **1.** | One – one as for x 1 2  implies f(x 1) = f (2  )  **OR**  R = { 1,2,3} | 1 |
| **2.** | 7 | 1 |
| **3.** | [0] = { 0,2, 4}  **OR**  [(2,5)] = { (1, 4) , ( 2, 5) , ( 3, 6) , (4, 7 ), ( 5, 8) , ( 6, 9 ) } | 1 |
| **4.** | ( 1,2) | 1 |
| **5.** | **OR**  **0** | 1 |
| **6.** | < 0, > | 1 |
| **7.** | 0  **OR**  **1** | 1 |
| **8.** |  | 1 |
| **9.** | **4**  **OR**  **4** | **1** |
| **10.** |  | 1 |
| **11.** |  | 1 |
| **12.** | 5 | 1 |
| **13.** |  | 1 |
| **14.** |  | 1 |
| **15.** |  | 1 |
| **16.** | X = 2 | 1 |
|  |  |  |
|  | **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** |  |
| **17.** |  | 4 |
|  | (i) b) |  |
|  | (ii) b |  |
|  | (iii)a |  |
|  | (iv)c |  |
|  | (v)c |  |
| **18.** |  | 4 |
|  | (i) c |  |
|  | (ii) a |  |
|  | (iii)d |  |
|  | (iv)b |  |
|  | (iv)a |  |
|  | **Part – B** |  |
| **Section III**  **Each question carries 2marks** |
| **19.** | at x = 0 is 5 | 1  1 |
| **20.** | 2A = 3 B- 5 C + O  2 A = 3 - 5  A =  **OR**  X = Y = | 1  1  1+1 |
| **21.** | tan-1[2 cos(2 sin-1)]= tan-1[2 cos(2 sin-1 (sin )]  = tan-1[2 cos()]  = tan-1[2x )]  = | 1  1 |
| **22.** |  | 1  1 |
| **23.** | tan  a=2  **OR**  **= = 2** | 1  1  1+1 |
| **24.** | Centroid of the triangle ABC with coordinates A ( a,00) B ( 0,b,0) and C( 0,0,c) = (  But the centroid is given (  a= 3 ,b c= 3  Equation of the plane | 1  1 |
| **25.** | tan-1y = tan-1 x +c | 1  1 |
| **26.** | Slope = 11 | 2 |
| **27.** | Required Area = sq units | ½  1 ½ |
| **28.** | P ( only one of them coming to the school in time ) = P ( A    **OR**  S = { (b,b),(b, g),(g,b),(g,g)}  E and F denotes the following events  E :Both are boys  F: at least one of them is a boy  P( E/F) = 1/3 where P ( F) = ¾ and P ( E = 1/4 | 2  2 |
|  | **Section IV**  **All questions are compulsory. In case of internal choice attempt any one**  **Each question carries 3 marks** |  |
| **29.** | f: R+ [4, )  Let x1, x2 be any two arbitrary elements of the domain of f such that  f (x1) = f(x2).  Then  f(x1) = f(x2) => + 4 = + 4  x12 = x22 => x1 = x2 [ since x1 , x2 R+ ]  f is one-one.  Let y be any arbitrary element in the co-domain of f. Then  y = f(x) = x2 + 4 for some x R+  This gives x2 = y – 4  => x =  Since x > 0, x = which is a non-negative real number for all y [4, )  Since every element y in the co-domain has its pre-image x in domain given by  x =  So, the function f is onto.  Since f is one-one and onto, so f is invertible.  f-1 is given by f-1(y) = | 1  2 |
| **30.** | ,  Differentiating the given equation , we get ,  Slope of tangent at (2,3) = =-  Equation of tangent : 32x + 27 y = 145  Slope of normal at ( 2,3) =  Equation of normal : 27 x – 32 y = -42 | 1  1  1 |
| **31.** | F(x) =  LHD = = 1  RHD = = 2  LHD RHD  F( x) is not differentiable at x = 2  **OR** | 1  1  1  1  1  1 |
| **32.** | -----------------------(1)  F(  =  = f( x,y)  Hence diff equation is homogeneous  Putting y = vx so that  Subst in (1)        Integrating both sides    V – log = log    X = is the required solution of diff equation. | 1  1  1 |
| **33.** | ;  1 – sin2x = t 2  When x= 0, t = -1 and x =  = =  I =  = = - | 1  1  1 |
| **34.** | Point of intersection , x = 4  Area of the shaded region =    = 8 + 16  **OR**    Ordinate of intersection points are 1 & – 2 therefore  Required area  = area ABCD A – *area* ABEA | 1  1  1  1  1  1 |
| **35.** | ,  Let | 1  1  1 |
| **Section V**  **All questions are compulsory. In case of internal choice attempt any one**  **Each question carries 5 marks** | |  |
| **36.** | = = I  AB = I  Now system of equations reduces to AX = C      = =  X = 0 , y = 5 , z =3  **OR**  A=  . So exists.  Adj A =    The system of equation is    X= =  X = 0; y = -5 ; z = -3 | **1**  **1**  **1 ½**  **1 ½**  **1**  **1**  **1**  **1**  **1** |
| **37.** | Given equations are:  Equation of line (i)  Equation of plane 4x + 12y – 3z + 1 = 0. (ii)  Let  Any point on line (i) is N (say)  Given point is P (-2, 3, -4). Let line drawn from P parallel to plane (ii) meet the line (i) at N.  So direction ratios of line PN are  < 3  Or  Now PN is parallel to plane (ii) if a normal to the plane is perpendicular to PN.     * 12   Hence, coordinates of N are  or  Distance =  = = = units.  **OR**  Let the intersecting for the first line be P(4λ,6λ-1,2λ-1) second line be  P (7  4λ-7 ; 6λ- ; 2λ=5  Satisfies the third equation . Lines intersect.  Equation of the plane containing P,A & C becomes  5x-7y+11z+4=0 | 1  1  1  1  1  1  1  1  1  1  1 |
| **38.** | Minimize Z = 5x + 10 y  x + 2y     |  |  | | --- | --- | | Corner points | Z= 5x + 10 y | | A ( 60 , 0) | 300 | | B ( 120, 0 ) | 600 | | C ( 60, 30 ) | 600 | | D ( 40, 20 ) | 400 |   The minimum value of Z = 300 at ( 60, 0)  **OR**  Maximise Z = 2x + 5y  2x+ 4y     |  |  | | --- | --- | | Corner points | Z= 2x + 5 y | | A ( 0 , 0) | 0 | | B ( 2, 0 ) | 4 | | C ( 0, 2 ) | 10 | | D ( , ) |  |   The maximum value of Z = 10 at ( 0, 2) | 3 ½  1 ½  3 ½  1 ½ |

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