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**MATHMATICS (HSSC-II)**

**SECTION –A (Marks: 20) Time Allowed: 25 Min**

 **Note:** Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

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|  | **Questions**  | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** |
| **1.** | What result occurs, in evaluating? | 9 | -9 | 27 | does not exist |  |  |  |  |
| **2.** | Which one of the following represents an Odd function? | f(x)= | f(x)=3x4-2x2+7 | f(x)=sinx +cosx | f(x)=(x+2)2 |  |  |  |  |
| **3.** | Which one of the following represents f-1 ( ), if f(x)=? |  |  |  |  |  |  |  |  |
| **4.** | If f(x)=cosx, x()then what is the result of f’()? |  |  | - | - |  |  |  |  |
| **5.** | In which one of the following intervals, f(x) = 2x2-8x+1 increases its value? | (-,2] | (-,0] | [0,  | (2,- |  |  |  |  |
| **6.** | For a function f(x) =sin(sin) what evaluates f’ (0)? | 1 | 0 | -1 | does not exist |  |  |  |  |
| **7.** | Which one of the following options represents f’(x)=ex +sin x+1 and f(0)=2? | f(x)=ex+cos x+x | f(x)=ex-cosx +x+2 | f(x)=xex-1-cosx +x+3 | f(x)=ex+cosx |  |  |  |  |
| **8.** | What results dx? | e-1 | e | 0 |  |  |  |  |  |

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| **9.** | The graph of f(x) = is shown in the given figure. For what value of x,f(x) has its maximum value? | a | b | c | d |  |  |  |  |
| **10.** | Which one of the following lines passes through (-7,7)(-7,-7) and (-7,0)? | x=-7 | y=-7 | x+y=-7 | y=-x+7 |  |  |  |  |
| **11.** | How many intercepts are there in the graph of y=? | no intercepts  | two x-intercepts  | two y-intercepts  | one x and one y-intercepts |  |  |  |  |
| **12.** |  At what angle lines 3y=2x+5 and 3x+2y=8 cut each other? |  |  |  | 0 |  |  |  |  |
| **13.** | Which one of the following options does not satisfy 4x-3y<2? | (1,1) | (0,0) | (3,0) | (-2,1) |  |  |  |  |
| **14.** | What are the coordinates of the centre of a circle x2+y2-8x+12y+21=0? | (4,6) | (-4,6) | (4,-6) | (-4,-6) |  |  |  |  |
| **15.** | What is the equation of the axis of a parabola y2-2y+8x-23=0? | y=-1 | x=3 | y=1 | x=-3 |  |  |  |  |
| **16.** | If(5,-2),(5,4) are the vertices of a hyperbola, then centre of the hyperbola is:  | (0,0) | (5,3) | (5,1) | (5,0) |  |  |  |  |
| **17.** | Which one of the following represents the graph of 4x2+y2-8x+4y-9=0? | circle  | ellipse  | parabola  | hyperbola |  |  |  |  |
| **18.** | For what value of , vectors 4i+3j-3k and  i+3k have the same magnitude? | 5 | -5 | 25 | 5 |  |  |  |  |
| **19.** | If vectors 3i-6j+k and 2i -4j+k are parallel to each other , then the value of is: | 2/3 | 3/2 | -3/2 | -2/3 |  |  |  |  |
| **20.** | What is the projection of i-k along j+k? |  |  | - | -1 |  |  |  |  |

** HCCS EDUCATIONAL SYSTEM**

 **MATHEMATICS HSSC II**

 **(PRE BOARD EXAM, 2024)**

**(SUBJECTIVE)**

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| **Time allowed: 2:40 Hours Total Marks Section B and C:68** |
| **Note: The Questions of sections B and C are to be answered on the separately provided answer book. Use supplementary answer sheet i.e. sheet – B if required. Write your answers neatly and legibly.**  |

**SECTION – B (48 Marks)**

**Q.2 Attempt all parts. All parts carry equal marks. (12 x 4= 48)**

|  |
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| **1. If f(x)=-4+and g(x)=, then find the following** (𝑎) 𝑓𝑜𝑔(𝑥) (𝑏) 𝑔𝑜𝑓(𝑥) (𝑐) 𝑓𝑜𝑓(𝑥) (𝑑) 𝑔𝑜𝑔(𝑥) |
| **OR** |
| State the domain and range of 𝑓 −1 of the function: (i) 𝑓(𝑥) = −4 (ii) 𝑓(𝑥) = , x≠ 1 |
| **2. Let (𝑥) = (𝑥 4 − 𝑥 3 + 𝑥 2 − 𝑥 + 1)(3𝑥 3 − 2𝑥 2 + 𝑥 − 1).Use the rule for differentiating products to find𝑓 ′ (1).** |
| **OR** |
|  Find if𝑥 = 3 + 𝑐𝑜𝑠𝑡 and 𝑦 = 1 – 𝑠𝑖𝑛*t.* |
| **3. In which interval a function (𝑥) = (𝑥 2 − 6𝑥 + 8)(𝑥 − 5) increases or decreases?** |
| **OR** |
| Use differentials to approximate the value of (33) 1 /5. |
| **4. Evaluate**  |
| **OR** |
| Find the area in the first quadrant bounded by (𝑥) = 4𝑥 − 𝑥 2 and the x-axis. |
| **5. A straight line passes through the point (− 4, 8) and makes an angle 30° with 𝑥 + − 𝑎𝑥𝑖𝑠. Find the equation of the straight line.** |
| **OR** |
| Check whether the points (3, 1) and (–1, 6) lie above or below the line 2x – 4y + 7 = 0 |
| **6. What is the equation of a circle when lines 3y = 4x – 5 and 3y = –4x – 13 are the diameters and a point (–5, 0) lies on the circle?**  |
| **OR** |
| Write the equation of parabola with focus (– 2, 1)and directrix 𝑥 = 5 |
| **7. Find the volume of a parallelepiped determined by the vectors** **𝑢 = −2𝑖 + 5 𝑗 + 3𝑘, 𝑣 = 𝑖 + 3 𝑗 − 2𝑘 and 𝑤 = −3𝑖 + 𝑗 − 2 .** |
| **OR** |
| Find the angle between the vectors 𝑢 = 3𝑖 + 𝑗 − 𝑘 and 𝑣 = 2𝑖 − 𝑗 + . |
| **8. Differentiate y= w.r.t. x**  |
| **OR** |
| If x2= , then find .  |
| **9. Solve dx.** |
| **OR** |
| Evaluate. |
| **10. For what values of k, the lines 2x-5=ky and (k+1)x=6y-3 have same gradient?** |
| **OR** |
| The line joining the points A( 0,6) and B(8,0 ) cuts the line y=x+1 at the point M . Find the coordinates of M . |
| **11. Find the equation of hyperbola centered at the origin that has a focus at ( 3,0) and the line x =1 as the corresponding directrix.** |
| **OR** |
| Locate the vertices of an ellipse of eccentricity 0.8 whose foci lie at the points (0, 8). Also find the equation of an ellipse. |
| **12. Graph the solution region of the system of the linear inequalities and find the cornor points: 3x+7y21; 2x-y-3, y.** |
| **OR** |
| Graph the feasible region and find corner points of the following linear inequalities:   |

**SECTION – C (32 Marks)**

 **NOTE: Attempt all questions. All questions carry equal marks. (4 x8=32)**

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| **Q.3** | **For what value of and m the function**g(x) = is continuous for all x. |
|  | **OR** |
|  | Find the volume of tetrahedron whose vertices are A(2,1,8), B(3,2,9), c(2,1,4) and D(3,3,0). |
| **Q.4** | **A particle is moving in a straight line and its acceleration is given by a=2t-7.**i) Find v(velocity) in terms of t if v=10m/sec when t=0.ii) Find S(distance) in terms of t if s=0 when t=0.  |
|  | **OR** |
|  | Evaluate  |
| **Q.5** | **Find the family of lines through the point of Intersection of the lines** 3x-4y-10=0x+2y-10=0Find the member of the family which is i) parallel to the line with slope -2/3.ii) perpendicular to the line l:3x-4y+1=0 |
|  | **OR** |
|  | If y=acos() +b sin() prove that x2 + x+y=0. |
| **Q.6** | **A comet has a parabolic orbit with the sun at the focus. When the comet is 100 million km from the sun, the line joining the sun and the comet makes an angle of 60o with the axis of the parabola. How close will the comet get to the sun?** |
|  | **OR** |
|  | A factory manufactures two types of cell phones, conventional and smartphone. Each cell phone requires the use of two operations assembling and finishing, and there are at most 24 hours available for each operation. A conventional phone requires 1 hour of assembling and 2 hours of finishing, while a smartphone needs 2 hours of assembling and 1 hour of finishing. Due to some restrictions, the company can make at the most 15 gadgets a day. If a profit of Rs.1000 is realized for each conventional phone and Rs.4000 for a smartphone, how many of each should be manufactured to maximize the profit? |