Version No.				
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ROLL NUMBER						

MATHEMATICS HSSC-II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

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.

حصہ اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگران مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پُر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	$\lim_{x\to 0}\frac{(1+2x)^2-1}{x}=$	1	2	4	6	○	○	○	○
2.	$\lim_{x\to\infty}\left(1+\frac{2}{x}\right)^{\frac{x}{2}}=$	0	1	e	$\frac{1}{e}$	○	○	○	○
3.	$\frac{d}{dx}\left(e^x+2e^{-2x}\right)=$	e^x-4e^{-2x}	e^x+4e^{-2x}	$e^x-\frac{e}{2}^{-2x}$	e^x-2e^{-2x}	○	○	○	○
4.	If $\frac{dy}{dx}=\frac{3}{2}x^{\frac{1}{2}}-2x$, then $\frac{d^2y}{dx^2}=$	$\frac{3}{2}x^{\frac{1}{2}}-2$	$\frac{3}{4}x^{\frac{-1}{2}}-2$	$\frac{1}{4}x^{\frac{1}{2}}-2$	$\frac{4}{3}x^{\frac{-1}{2}}-2$	○	○	○	○
5.	If $y=\frac{1}{8}\sin 2x$, then the value of $\frac{d^4y}{dx^4}$ is:	$2\sin 2x$	$-2\sin 2x$	$2\cos 2x$	$-2\cos 2x$	○	○	○	○
6.	If $\vec{r}(t)=(1+t^2)\hat{i}+\sin t\hat{j}+\cos 2t\hat{k}$, then $\lim_{t\to 0}\vec{r}(t)=$	$\hat{i}+\hat{j}+\hat{k}$	$\hat{i}+\hat{k}$	$\hat{i}+\hat{j}-\hat{k}$	$\hat{i}+\hat{j}$	○	○	○	○
7.	If $\vec{r}(t)=t^2\hat{i}-2t\hat{j}$, then $\vec{v}(t)=$	$2t\hat{i}-\hat{j}$	$2t\hat{i}-2\hat{j}$	$t\hat{i}-2\hat{j}$	$t\hat{i}-\hat{j}$	○	○	○	○
8.	$\int\frac{\cos x}{\sin x}dx=$	$\ln\lvert\sin x\rvert+c$	$\ln\lvert\cos x\rvert+c$	$-\ln\lvert\sin x\rvert+c$	$-\ln\lvert\cos x\rvert+c$	○	○	○	○
9.	If $2\int_0^2 xdx=3k-2$, then the value of 'k' is:	2	3	4	6	○	○	○	○
10.	If $A(5,-5), B(-2,0)$ and $C(0,2)$ are vertices of a triangle then its centroid is:	(1,1)	(−1,−1)	(-1,1)	(1,−1)	○	○	○	○
11.	If $4x-2y=3$, then the slope of the line is:	−3	−2	2	3	○	○	○	○

	Question	A	B	C	D	A	B	C	D
12.	The equation of circle with centre $(-1,-1)$ and radius 2 is:	$(x-1)^2+(y-1)^2=2$	$(x-1)^2+(y-1)^2=4$	$(x+1)^2+(y+1)^2=2$	$(x+1)^2+(y+1)^2=4$	○	○	○	○
13.	If $x^2+y^2+4x+4y=0$ is an equation of circle then its radius is:	2	$2\sqrt{2}$	3	$3\sqrt{2}$	○	○	○	○
14.	If $y^2=8x$ is an equation of parabola, then its focus is:	$(0,4)$	$(0,2)$	$(2,0)$	$(4,0)$	○	○	○	○
15.	If $\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^2+y=3x$ is a differential equation, then its order and degree respectively are:	1,2	2,1	2,2	2,3	○	○	○	○
16.	If $\frac{1}{x}\frac{dy}{dx}=2$, then solution $y(x)$ of differential equation is:	x^2+c	$\frac{x^2}{2}+c$	$2x^2+c$	$-x^2+c$	○	○	○	○
17.	If $f(x,y)=x^2+3y$, then $\frac{\partial f}{\partial x}(1,1)=$	0	2	3	5	○	○	○	○
18.	If $f(x,y)=e^{x+y}$, then $\frac{\partial f}{\partial y}(1,0)$ is:	0	1	e	$\frac{1}{e}$	○	○	○	○
19.	If $f(x)=x^3-2x+1$ and $x_0=0$, then $f'(x_0)$ is:	−2	−1	1	2	○	○	○	○
20.	The value of Δx to approximate $\int_0^2(x^2+1)dx$ for $(n=4$ sub intervals) by 'Trapezoidal Rule' is:	0	0.25	0.5	1	○	○	○	○

$$\vec{v}(t)=\frac{d}{dt}\left(\vec{r}(t)\right)$$

ROLL NUMBER						

MATHEMATICS HSSC–II

30

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

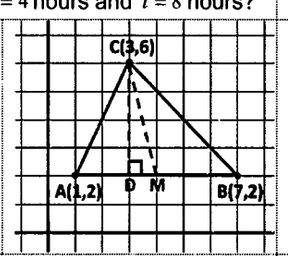
SECTION – B (Marks 48)

Q. 2 Solve the following: **(12 x 4 = 48)**

(i)	Evaluate: $\lim_{\theta\to 0}\frac{1-\cos\theta}{\sin^2\theta}$	04	OR	If $f(x,y)=3x^3+7x^2y+xy^2+5y^3$, then find: a. Degree of homogeneous function b. Verify Euler's theorem for $f(x,y)$	1+3
(ii)	Find the value of 'k' if $f(x)$ is continuous at $x=1$ $f(x)=\begin{cases}\frac{3x^2-3}{x-1}, & x\neq 1\\ 2(k-1)x, & x=1\end{cases}$	04	OR	If line $x-2y+\ell=0$ is tangent to the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$, then find: a. Value of ℓ b. Equation of tangent c. Length of latus rectum	04
(iii)	If $y=3\theta^3-\theta^{\frac{-3}{2}}$ and $u=2\theta^2-\theta^{\frac{-1}{2}}$ then find $\frac{dy}{du}$	04	OR	Compute two iterations up to 4 decimal places of $f(x)=x^3-5x+1$ by using Newton Raphson's method with initial start $x_0=0.5$	04
(iv)	If $\vec{r}(t)=t^3\hat{i}+e^{-2t}\hat{j}+\sin 2t\,\hat{k}$ is position vector of a moving particle at time (t), then find: a. Velocity vector $\vec{v}(t)$ b. Acceleration vector $\vec{a}(t)$	04	OR	Find the equation of line passing through the point of intersection of lines $x+y=3$, $x-y=1$ and parallel to line $x-3y=2$ and write it into slope intercept form.	3+1
(v)	Evaluate: $\int(3t+1)(t-1)dt$	04	OR	Find the equation of the circle passing through the points $(4,0),(0,5)$ and $(0,0)$	04
(vi)	Find the solution of differential equation $\frac{dy}{dx}=1+e^x y+y+e^x$	04	OR	Find the area under the graph of $f(x)=3x^2-2x$ over the interval $[1,3]$	04
(vii)	Find the extreme values of $f(x)=\frac{1}{3}x^3-x^2-3x+6$	04	OR	If $3x^2-2xy-8y^2=0$ is 2nd degree homogeneous equation then find: a. Pair of straight lines b. Angle between these lines	04
(viii)	Find the area of a triangle if its vertices are $A(5,4),B(2,1)$ and $C(7,3)$	04	OR	Evaluate $\int x^2\cos x\,dx$ using integration by parts method	04
(ix)	Find the equation of tangent and normal to parabola $x^2=8y-8$ at $x=4$	04	OR	Find $\frac{dy}{dx}$, if $y=(2x+3)^{\frac{3}{2}}$ by first principle	04
(x)	Evaluate $\int\frac{e^x dx}{e^{2x}+1}$ by substitution method	04	OR	If $\frac{x^2}{9}-\frac{y^2}{4}=1$ is an equation of hyperbola then find: a. Centre b. Vertices c. Foci d. Equation of asymptotes	04
(xi)	If $f(x,y)=\sqrt{x^3+y^3}$, then find: a. $\frac{\partial f}{\partial x}$ b. $\frac{\partial f}{\partial y}$	04	OR	If $f(x)=2x-3$ and $g(x)=3x+2$, and $h(x)=f(g(x))$ then find (i) $h(x)$ (ii) $h^{-1}(x)$ (iii) value of x if $h^{-1}(x)=2$	04
(xii)	Compute four iterations of the function $f(x)=2x^3-5$ in the interval $[0,2]$ by using Bisection method	04	OR	Find $\frac{dy}{dx}$, if $x^3+3x^2y^2+y^3=0$	04

SECTION – C (Marks 32)

Note: Solve the following Questions. **(4 x 8 = 32)**

Q.3	The growth of bacteria is given by the function of time (t) (in hours) $f(t)=500e^{0.2St}$, then find: a. Initial number of Bacteria at t=0 b. Number of Bacteria after $t=4$ hours c. Number of Bacteria after $t=8$ hours d. The time if number of Bacteria is $500e^3$. e. Is $f(t)$ continuous at $t=4$ hours and $t=8$ hours?	08	OR	If $f(x)=\frac{1}{8}x^3+\frac{1}{4}x^2+\frac{2}{x^2}+\frac{1}{2}$, then find: a. Equation of tangent at $x=2$ in $ax+by=c$ form b. Equation of normal at $x=2$ c. Test continuity of $f(x)$ at $x=0$	08
Q.4	In the given ΔABC find equation of: a. Median $\overline{CM}$ b. Altitude $\overline{CD}$ c. Right bisector of $\overline{AB}$ at mid-point, M 	08	OR	In an elliptic ground if $a=2b$ and $b=4$ then find: a. Vertices, co-vertices and centre b. Foci c. Eccentricity d. Equation in standard form with center at orgin e. Draw the rough diagram of ellipse using vertices and co-vertices only. (Graph paper is not required)	2+2 +2 +1+1
Q.5	Evaluate: $\int\frac{2x-1}{x^3-x^2-2x}dx$	08	OR	Solve the homogeneous differential equation $2xy\,dy-(x^2+3y^2)dx=0$	08
Q.6	Evaluate: $\int\frac{dx}{4x^3-x}$	08	OR	a. Approximate $\int_0^2(3x^2-2x)dx$ for $(n=2$ sub intervals) by using Simpson's Rule b. Find actual value of definite integral c. Calculate difference of both values	5+2 +1