Note: This is Model Paper for guidance of students & teachers.

Answer Sheet No. ____________

Model Paper Mathematics (OBJECTIVE)

Roll No. ____________

PART – II (Session 2012-14)

(INTERMEDIATE)

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Sign. Dy. Supdnt.   Fictitious Roll No. (For Office Use)   Sign. Candidate

Marks : 20   **Time : 30 Minutes**

Note:- Write your Roll No. in space provided. Over writing, cutting, using of lead pencil will result in loss of marks. All questions are to be attempted.

1- Each question has four possible answers, Tick (√) the correct answer. (20)

S.#	Questions	A	B	C	D
1	$\lim\limits_{x \to 0} \frac{\text{Sin}5x}{x}$ is equal to:	1	Zero	$\frac{1}{5}$	5
2	If f (x) = ____, then function is said to be even function:	$-f(x)$	$f(-x)$	$f(x)$	None of these
3	$\frac{d}{dx}(\log_5 x)$ is:	$5\ell nx$	1	$25\ell og_5 x$	$\frac{1}{x\ell n5}$
4	$\lim\limits_{\delta x \to 0} \frac{f(x+\delta x)-f(x)}{\delta x}$	$f'(x)$	$f'(a)$	$f'(2)$	$f'(0)$
5	$\frac{d}{dx}(\sec^{-1} x) =$	$\frac{1}{x\sqrt{x^2-1}}$	$\frac{-1}{x\sqrt{x^2-1}}$	$\frac{1}{1+x^2}$	$\text{Cot}^{-1}x$
6	$\frac{d}{dx}(a^x)$	$\frac{a^x}{\ell na}$	$\frac{\ell na}{a^x}$	$a^x \ell na$	a^x
7	Maclaurins expansion of $\ell n(1+x) =$	A: $x-\frac{x^3}{3!}+\frac{x^5}{5!}+.....$	B: $1-\frac{x^2}{2!}+\frac{x^4}{4!}+.....$	C: $-x-\frac{x^2}{2!}-\frac{x^3}{3!}+.....$	D: $x-\frac{x^2}{2}+\frac{x^3}{3}-.....$
8	$\int_{-\pi}^{\pi} \text{Sin}\, x\, dx =$:	1	2	0	-1
9	$\int \frac{e^{\tan^{-1}x}}{1+x^2} dx =$:	$e^{\text{Sec}\,x}+c$	$e^{\text{Cot}^{-1}x}+c$	$e^{\tan x}+c$	$e^{\tan^{-1}x}+c$
10	$\int_a^b f(x)\,dx =$:	$-\int_a^b f(x)\,dx$	$-\int_b^a f(x)\,dx$	$\int_{-b}^{-a} f(x)\,dx$	$-\int_{-a}^{-b} f(x)\,dx$
11	$\int \frac{dx}{x^2+a^2} =$:	A: $\ell n(x+\sqrt{x^2+a^2})+c$	B: $\frac{1}{\ell n(x+\sqrt{x^2-a^2})}+c$	C: $\ell n(x+\sqrt{x^2-a^2})+c$	D: $\frac{1}{a}\tan^{-1}\frac{x}{a}+c$
12	If $\phi'(x)=f(x)$, then $\phi(x)$ is called ____ of $f(x)$:	Derivative	Integral	Differential coefficient	Area
13	$\int\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^2 dx =$:	$\frac{1}{2}x^2-2x+c$	$\frac{1}{2}x^2-\ell nx+c$	$x^2-x+\ell nx+c$	$\frac{x^2}{2}-2x+\ell nx+c$
14	If P (x , y) is point in coordinate system, then x is called:	Coordinates	Ordinate	Abscissa	Origin
15	The centroid of a triangle divides each median in the ratio:	2 : 1	3 : 1	3 : 2	3 : 4
16	$x=-1$ is the solution of the inequality:	$2x+3\le 0$	$2x+3>0$	$x-2>0$	$2x+1>0$
17	The radius of circle $x^2+y^2+2gx+2fy+c=0$ is:	$\sqrt{g^2+f^2-c}$	g^2+f^2-c	g^2-f^2+c	$g+f^2-c$
18	Which one is equation of point circle?	$x^2-y^2=7$	$x^2+y^2=4$	$x^2+y^2=0$	$x^2+y^2=-1$
19	If the vectors $2\hat{i}+4\hat{j}-7\hat{k}$ & $2\hat{i}+6\hat{j}+x\hat{k}$ are perpendicular then x = ____	8	2	1	4
20	The work done by force $\underline{F}$ through displacement $\underline{d}$ is:	$\|\underline{F}\|\|\underline{d}\|\tan\theta$	$F\,d\,\text{Sec}\theta$	$F\,d\,\text{Sin}\theta$	$\underline{F}\cdot\underline{d}$

(End)

Roll No. ________

Model Paper Intermediate Part Second Session 2012-14 & onward

MATHEMATICS (Subjective)

Time: 02:30 Hours Marks: 80

SECTION – I

2. Write short answers of any EIGHT parts: 16

(i) Prove the identity: $\cosh^2(x) - \sinh^2(x) = 1$

(ii) Evaluate $\lim_{x \to 0} \dfrac{\sin x^\circ}{x}$

(iii) If $y = x^4 + 2x^2 + 2$, prove that $\dfrac{dy}{dx} = 4x\sqrt{y-1}$

(iv) Find $\dfrac{dy}{dx}$ if $xy + y^2 = 2$

(v) Find $\dfrac{dy}{dx}$ if $y = \sin(2x)$ at $x = \dfrac{\pi}{2}$

(vi) If $\tan y(1 + \tan x) = 1 - \tan x$, show that $\dfrac{dy}{dx} = -1$

(vii) Differentiate $\cot^{-1}\dfrac{x}{a}$ with respect to x

(viii) Find $\dfrac{dy}{dx}$ if $y = \dfrac{x}{\ell nx}$

(ix) Find $f'(x)$ if $f(x) = (x+1)^x$

(x) Find stationary points for the function $f(x) = 5x^2 - 6x + 2$

(xi) Define increasing and decreasing function.

(xii) Find y_2 when $y = (2x+5)^{\frac{3}{2}}$

3. Write short answers of any EIGHT parts: 16

(i) Using differentials find $\dfrac{dy}{dx}$ and $\dfrac{dx}{dy}$ if $xy - \ell nx = c$

(ii) Evaluate $\int (\sqrt{x} + 1)^2 \, dx$

(iii) Evaluate $\int \dfrac{x^2}{4 + x^2} \, dx$

(iv) Find $\int \dfrac{\cos x}{\sin x \, \ell n \sin x} \, dx$

(v) Find $\int \ell nx \, dx$

(vi) Find $\int e^{-x}(\cos x - \sin x) \, dx$

(vii) Find $\int \tan^4 x \, dx$

(viii) Find $\int \dfrac{2}{x^2 - a^2} \, dx$

(ix) Find $\int_1^2 (x^2 + 1) \, dx$

(x) Find area bounded by $y = \cos x$ from $x = -\dfrac{\pi}{2}$ to $x = \dfrac{\pi}{2}$

(xi) Graph the solution region of linear inequality $3x - 2y \geq 6$ in xy-plane.

(xii) Define an objective function and optimal solution.

4. Write short answers of any NINE parts: 18

(i) Find the coordinates of the point which divides internally the join of $A(-6, 3)$ and $B(5, -2)$ in the ratio 2 : 3.

(ii) Find h such that point $A(-1, h)$, $B(3, 2)$ and $C(7, 3)$ are collinear.

(iii) Convert the equation of straight line $2x - 4y + 11 = 0$ into two intercepts form.

(iv) Find the point of intersection of the lines $x + 4y - 12 = 0$ and $x - 3y + 3 = 0$

(v) Find the lines represented by $3x^2 + 7xy + 2y^2 = 0$

(Continued P/2)

(vi) Find the center and radius of the circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$

(vii) Find equation of tangent to the circle $x^2 + y^2 = 25$ at $P(3, 4)$.

(viii) Find focus and directrix of the parabola $x^2 = -16y$

(ix) Find eccentricity of the ellipse $25x^2 + 9y^2 = 225$

(x) If O is the origin and $\overrightarrow{OP} = \overrightarrow{AB}$, find point P when A and B are $(-3, 7)$ and $(1, 0)$ respectively.

(xi) Find α, so that $|\alpha\hat{i} + (\alpha+1)\hat{j} + 2\hat{k}| = 3$

(xii) Find scalar λ so that the vectors $2\hat{i} + \lambda\hat{j} + 5\hat{k}$ and $3\hat{i} + \hat{j} + \lambda\hat{k}$ are perpendicular.

(xiii) Prove that $\vec{a} \times (\vec{b} + \vec{c}) + \vec{b} \times (\vec{c} + \vec{a}) + \vec{c} \times (\vec{a} + \vec{b}) = 0$

SECTION – II   Attempt any THREE questions. Each question carries 10 marks.

5. (a) Prove that $\lim_{x \to 0} \dfrac{a^x - 1}{x} = \log_e a$ — 05

(b) If $x = a\cos^3\theta$, $y = b\sin^3\theta$, show that $a\dfrac{dy}{dx} + b\tan\theta = 0$ — 05

6. (a) Evaluate $\int x \cdot \sin^{-1}x \, dx$ — 05

(b) Find the distance between the parallel lines $12x + 5y - 6 = 0$ and $12x + 5y + 13 = 0$. Also find the equation of the parallel line lying midway between them. — 05

7. (a) Solve the differential equation $\dfrac{dy}{dx} = \dfrac{3x^2}{4} + x - 3$ if $y = 0$ when $x = 2$ — 05

(b) Minimize $z = 3x + y$ subject to the constraints $3x + 5y \geq 15$, $x + 6y \geq 9$, $x \geq 0$, $y \geq 0$ — 05

8. (a) Find equation of circle passing through $A(3, -1)$, $B(0, 1)$ and having center at $4x - 3y - 3 = 0$ — 05

(b) Prove that the line segments joining the mid points of the sides of a quadrilateral taken in order form a parallelogram using vectors. — 05

9. (a) Find the centre, foci, eccentricity, vertices of hyperbola $9x^2 + 12x - y^2 - 2y + 2 = 0$ — 05

(b) Find the volume of tetrahedron with the vertices $A(2, 1, 8)$, $B(3, 2)$, $C(2, 1, 4)$ and $D(3, 3, 0)$ — 05

(End)