MathCity.org Merging man and maths	**Federal Board – Model Paper 2009** **Mathematics II (Objective), Time Allowed: 20 Min.** **Marks: 20** , Available online @ http://www.mathcity.org/fsc

Section – A (20 marks)

Note: Section A is compulsory.

Q. 1(c): Choose and tick (✓) the best possible answer.

i) If S = {*a*, *b*, *c*} then the number of distinct relations on S is

(a) 9 (b) 2^9 (c) 2^3 (d) 9^2

ii) Let g = {(1, 1), (2, 3), (3, 2), (4, 4)} be a function from S onto S, then the value of $g^{-1}(2)$ is,

(a) 2 (b) 3 (c) 4 (d) 1

iii) The value of $\lim_{x\to 0}\frac{\sin ax}{bx}$ is

(a) a (b) $\frac{a}{b}$ (c) b (d) $\frac{b}{a}$

iv) The projection of $\underline{a}=\hat{\underline{i}}-2\hat{\underline{j}}+\hat{\underline{k}}$ along $\underline{b}=4\hat{\underline{i}}-4\hat{\underline{j}}+7\hat{\underline{k}}$ is

(a) $\frac{19}{8}$ (b) $\frac{9}{19}$ (c) $\frac{8}{19}$ (d) $\frac{19}{9}$

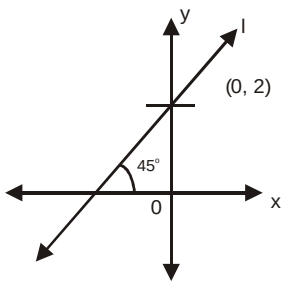
v) A equation $(x-1)^2+(y-3)^2+(z-5)^2=25$ represents

(a) a circle (b) a sphere (c) a plane (d) an ellipse

vi) The solution set of $x > 10$ is _____

(a) $10>x>\infty$ (b) $10<x<-\infty$ (c) $10>x>-\infty$ (d) $10<x<\infty$

vii) Equation of the line *l* given in the figure is



(a) $y = 2x + 1$ (b) $y = 2x - 1$ (c) $y = x + 2$ (d) $y = x - 2$

viii) The value of $\int\frac{1}{y\ln y}dy$ is

(a) $\ln|y|+c$ (b) $\ln\frac{1}{y}+c$ (c) $\frac{1}{y}+c$ (d) $\ln[\ln|y|]+c$

ix) If f and g are continuous functions and $\int_1^3 f(y)\,dy = 8, \int_3^7 f(z)\,dz = 9$ then the value of $\int_1^7 f(z)\,dz$ is

(a) 7 (b) 1 (c) 6 (d) 17

x) The derivative of $\sin^{-1}a + \tan^{-1}a$ w.r.t x is equal to

(a) $\frac{1}{\sqrt{1-a^2}}$ (b) $\frac{1}{1+a^2}$ (c) $\frac{1}{\sqrt{1-a^2}} + \frac{1}{1+a^2}$ (d) 0

xi) The derivative of $f(x) = |x|$ does not exit at

(a) $x = 0$ (b) $x = 1$ (c) $\mathbb{R}$ (d) None of these

xii) The point $P(-5,6)$ lies _____ the circle $x^2 + y^2 + 4x - 6y = 12$

(a) Inside (b) Out side (c) On (d) None of these

xiii) The curve $y^2 = 4ax$ is symmetric about

(a) y-axis (b) x-axis (c) Both a & b (d) None of these

xiv) If the velocity of a particle moving in a straight line is given by $v = 3t^2$ then the distance traveled by it in the first T seconds is

(a) $3t^2 + c$ (b) $t^3 + c$ (c) $3T^2 + c$ (d) $T^3 + c$

xv) The value of the $(\hat{i} + 2\hat{j}) \times \hat{k} =$

(a) $3\hat{i} - \hat{j}$ (b) $2\hat{i} - \hat{j}$ (c) $2 + 2\hat{k}$ (d) None of these

xvi) The stationary point of the function $f(x) = 5x^2 - 6x + 2$ is

(a) 5/3 (b) 3/5 (c) 0 (d) 1

xvii) Two lines $l_1 : a_1x + b_1y + c_1 = 0$ and $l_2 : a_2x + b_2y + c_2 = 0$ are perpendicular if

(a) $a_1b_2 - b_1a_2 = 0$ (b) $a_1a_2 + b_1b_2 = 0$ (c) $a_1b_1 + a_2b_2 = 0$ (d) None of these

xviiii) Angle between two non-vertical lines with slopes m_1 and m_2 is

(a) $\tan^{-1}\left(\frac{m_2 + m_1}{1 + m_1m_2}\right)$ (b) $\tan^{-1}\left(\frac{m_2 - m_1}{1 + m_1m_2}\right)$ (c) $\frac{m_2 - m_1}{1 - m_1m_2}$ (d) None of these

xix) $\int_{-a}^{a} f(x)dx = 0$, when f is ……. function

(a) Even (b) Odd (c) Polynomial (d) Rational

xx) The parametric equation $x = r\cos\theta,\ y = r\sin\theta$ represent a

(a) Parabola (b) Ellipse (c) Circle (d) Hyperbola

MathCity.org Merging man and maths	**Federal Board – Model Paper 2009** **Mathematics II (Subjective), Time Allowed: 2.40 Hours** **Max. Marks: 80** , Available online @ http://www.mathcity.org/fsc

Section–B

Attempt any Ten parts. All parts carry equal marks (4 ×10 =40 marks)

Q # 2(i) Define even and odd function and determine whether $f(x) = \dfrac{3x}{x^2+1}$ is even or odd.

(ii) Find the domain and range of $g(x) = \begin{cases} x-1 & ; \quad x<3 \\ 2x+1 & ; \quad 3 \le x \end{cases}$

(iii) Find the value of m & n, so that f is continuous at $x=3$.

$$f(x) = \begin{cases} mx & ; \quad x<3 \\ n & ; \quad x=3 \\ -2x+9 & ; \quad x>3 \end{cases}$$

(iv) Find $\dfrac{dy}{dx}$ if $y = \log_{10}\left(ax^2+bx+c\right)$.

(v) Determine the interval in which f is increasing or decreasing if

$$f(x) = \sin x \ ; \quad x \in [-\pi, \pi].$$

(vi) Find the approximate increase in the volume of cube if the length of its each edge changes from 5 to 5.02.

(vii) Evaluate: $\displaystyle\int \frac{\cot\sqrt{x}}{\sqrt{x}}dx$.

(viii) Evaluate; $\displaystyle\int_{-1}^{2}\left(x+|x|\right)dx$.

(ix) Derive equation of a straight line in one point and slope form.

(x) Find the point P on the join of $A(1,4)$ and $B(5,6)$ that is twice as far from A as B is from A and lies on the same side of A as B does.

(xi) Find the centre and radius of the circle with the given equation

$4x^2+4y^2-8x+12y-25=0$

(xii) Find the eccentricity, the coordinate of the vertices and foci of the hyperbola

$$\frac{y^2}{16}-\frac{x^2}{49}=1.$$

(xiii) Find a vector whose magnitude is 4 and parallel to $2\hat{i}-3\hat{j}+6\hat{k}$.

(xiv) Find an equation of the parabola having its focus at origin and directrix parallel to the $y-$axis.

Section_C

Attempt any FIVE questions. All questions carry equal marks (5×8=40)

Q # 3 : Prove that $\lim_{x\to 0}\frac{a^x-1}{x}=\log_e a$.

Q # 4 : Prove by vector method that in any triangle ABC (with usual notations)

$$c=a\cos B+b\cos A$$

Q # 5 : Differentiate $\cos\sqrt{x}$ w.r.t x by definition.

Q # 6: Find the general solution of the equation $\frac{dy}{dx}-x=xy^2$. Also find the particular solution if $y=1$ when $x=0$.

Q # 7: Find an equation of the line having x-intercept -9 and slope -4.

Q # 8: Graph the feasible region of the following system of linear inequalities and find the corner points.

$$x+y\le 5\quad,\quad -2x+y\ge 2\quad,\quad x\ge 0.$$

Q # 9: Find equation of circle of radius 2 and tangent to the line $x-y-4=0$ at $A(1,-3)$.