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Lahore Board - Annual 2008 Paper II
Mathematics II (Objective), Time Allowed: 30 Min.
Marks: 20 , Available online @ http://www.mathcity.org/fsc

OBJECTIVE

Q. 7: Some possible answers to each statement are given below. Tick (P) mark the correct answer.

i) $x = at^2$ and $y = 2at$ represents:

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

ii) $\lim\limits_{x\to 0}\dfrac{e^x - 1}{x} =$ ....

a) 0 b) 1c) e d) ∞

iii) If $f(x) = x^{\frac{2}{3}}$ then $f'(8) =$

a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) 3

iv) If $y = \cos^{-1}\dfrac{x}{a}$, then $\dfrac{dy}{dx} =$

a) $\dfrac{-1}{\sqrt{a^2 - x^2}}$ b) $\dfrac{1}{\sqrt{a^2 - x^2}}$
c) $\dfrac{1}{a\sqrt{a^2 - x^2}}$ d) $\dfrac{1}{\sqrt{a^2 + x^2}}$

v) $f(x) = f(0) + xf'(0) + \dfrac{x^2}{\lfloor 2} f''(0) + ... + \dfrac{x^n}{\lfloor n} f^{(n)}(0) + ...$

a) Taylor's series b) Binomial series
c) Machlaurin's series d) Power series

vi) $\int \sec 5x \tan 5x \, dx =$

a) $5\sec 5x \tan 5x + c$ b) $\dfrac{1}{5}\sec x + c$
c) $\dfrac{\sec 5x}{5} + c$ d) $\dfrac{\tan 5x}{5} + c$

vii) $\int \cos x \left(\dfrac{\ln \sin x}{\sin x}\right) dx =$

a) $\ln(\sin x)^2 + c$ b) $\dfrac{1}{2}\ln(\sin x)^2 + c$
c) $(\ln \sin x)^2 + c$ d) $\dfrac{1}{2}(\ln \sin x)^2 + c$

viii) $\int xe^x dx =$

a) $xe^x + e^x + c$ b) $e^x + x + c$
c) $xe^x - e^x + c$ d) $xe^x + c$

ix) $\int_0^{\frac{1}{\sqrt{3}}} \dfrac{dx}{1 + x^2} =$

a) $\dfrac{p}{2}$ b) $\dfrac{p}{6}$ c) $\dfrac{p}{4}$ d) $\dfrac{p}{3}$

x) The solution of $\frac{dy}{dx}=-y$ is

a) $y=e^{x}$ b) $y=ce^{-x}$ c) $y=e^{-x}$ d) $y=ce^{x}$

xi) If $a=0$ in the $ax+by+c=0$ then line is

a) || to $x-$axis b) || to $y-$axis

c) Inclined d) Passing through origin

xii) The point of intersection of medians of a triangle is called

a) Centroid b) Orthocentre

c) Circumcentre d) In-centre

xiii) $(0,0)$ is one of the solutions of inequality;

a) $3x+5y>7$ b) $2x-3y>4$

c) $x+3y>5$ d) $2x+3y<5$

xiv) Radius r of a circle $x^2+y^2+2gx+2fy+c=0$ is

a) $\sqrt{g^2+f^2+c}$ b) $\sqrt{g^2+f^2-c}$

c) $\sqrt{g+f+c}$ d) $\sqrt{g^2-f^2-c}$

xv) The point where the axis meets the parabola is called

a) Focus b) Directrix c) Centre d) Vertex

xvi) For the ellipse $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$ foci are

a) $(\pm c,0)$ b) $(0,\pm c)$ c) $(c,0)$ d) $(0,c)$

xvii) For the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ the directrices are

a) $x=\pm\frac{c}{e}$ b) $x=\pm\frac{c}{e^2}$ c) $x=\pm\frac{c}{2e}$ d) $y=\pm\frac{c}{e^2}$

xviii) For the equation of tangent to conic x^2 is replaced by

a) xx_1 b) x c) $\frac{1}{2}(x+x_1)$ d) xx_1^2

xix) Cosine of the angle between two non-zero vectors $\underline{a}$ and $\underline{b}$ is

a) $\underline{a}\cdot\underline{b}$ b) $\frac{|\underline{a}||\underline{b}|}{\underline{a}\cdot\underline{b}}$ c) $\frac{\underline{a}\cdot\underline{b}}{|\underline{a}||\underline{b}|}$ d) $\frac{\underline{a}\times\underline{b}}{|\underline{a}||\underline{b}|}$

xx) If $\underline{a}\times\underline{b}=0$ and $\underline{a}\cdot\underline{b}=0$ then

a) $\underline{a}$ and $\underline{b}$ are parallel b) $\underline{a}$ and $\underline{b}$ are perpendicular

c) Either $\underline{a}=0$ or $\underline{b}=0$ d) Both $\underline{a}$ and $\underline{b}$ are non-zero

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Section – I

Note: All questions are to be attempted on answer book.

Q # 1: Write any TWENTY-FIVE short answers of the following questions:

(i) If $f(x)=\sin x$, find $\dfrac{f(a+h)-f(a)}{h}$

(ii) Evaluate the limit: $\lim\limits_{x\to 2}\dfrac{x^3-8}{x^2+x-6}$

(iii) Discuss the continuity of $f(x)$:

$$f(x)=\begin{cases}2x+5 \text{ , } if \;\; x\le 2\\ 4x+1 \text{ , } if \;\; x>2\end{cases} \quad \text{at } x=2.$$

(iv) Differentiate w.r.t x of $\dfrac{2x-3}{2x+1}$.

(v) Differentiate $\sin^2 x$ w.r.t $\cos^4 x$

(vi) Find $\dfrac{dy}{dx}$, if $y=\cosh 2x$.

(vii) If $y=\sin 3x$, find y_2

(viii) Examine the function defined as $f(x)=1+x^3$ for extreme value.

(ix) Find dy when $y=x^2-1$ when 'x' change from 3 to 2.02

(x) Evaluate: $\int\dfrac{1-x^2}{1+x^2}dx$

(xi) Evaluate: $\int\dfrac{\sec^2 x}{\sqrt{\tan x}}dx$

(xii) Evaluate: $\int \ln x dx$

(xiii) Evaluate: $\int\dfrac{2a}{a^2-x^2}dx$

(xiv) Evaluate: $\int a^{x^2} x\, dx$

(xv) Find the area bounded by $\sin x$ from $x=-p/2$ to $p/2$.

(xvi) Show that solution of $\dfrac{1}{x}\dfrac{dy}{dx}-2y=0$ is $y=ce^{x^2}$.

(xvii) Find the points trisecting the join of $A(-1,-4)$ and $B(6,2)$.

(xviii) Find k so that $\overline{AB}$ is perpendicular to $\overline{CD}$, where $A(7,3)$, $B(k,-6)$, $C(-4,5)$, $D(-6,4)$ are given vertices.

(xix) Find equation of line with x-intercept -9, slope -4.

(xx) Find the area of the triangular region whose vertices are $A(-5,3)$, $B(-2,2)$, $C(4,2)$.

(xxi) Find the interior angle A of the triangle with vertices $A(-2,11)$, $B(-6,-3)$, $C(4,-9)$.

(xxii) Find the measure of the angle between the line represented by the homogeneous equation $x^2-xy-6y^2=0$.

(xxiii) Define the associated equation of an inequality.

(xxiv) What is convex region? Define it.
(xxv) What is linear programming?
(xxvi) Define circle.
(xxvii) Find the vertex and directrix of $x^2 = -16y$.
(xxviii) Find the lengths of semi major axis and semi minor axis of ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$.
(xxix) Define hyperbola.
(xxx) Determine whether the point $P(-5,6)$ lies outside, on or inside the circle $x^2 + y^2 + 4x - 6y - 12 = 0$.
(xxxi) Find an equation of circle with ends of diameter at $(-3,2)$ and $(5,-6)$.
(xxxii) Write the most general equation of second degree of the conic.
(xxxiii) Find a, so that $\left| a\underline{i} + (a+1)\underline{j} + 2\underline{k} \right| = 3$.
(xxxiv) Find a so that the vectors $2\underline{i} + a\,\underline{j} + 5\underline{k}$ and $3\underline{i} + \underline{j} + a\,\underline{k}$ are perpendicular.
(xxxv) Find a vector perpendicular to each of the vectors $\underline{a} = 2\underline{i} + \underline{j} + \underline{k}$ and $\underline{b} = 4\underline{i} + 2\underline{j} - \underline{k}$.
(xxxvi) What is scalar triple product?
(xxxvii) Find the area of the triangle with vertices $A(1,-1,1)$, $B(2,1,-1)$ and $C(-1,1,2)$.

Section - II

Note: *Attempt any THREE questions.*

Q # 2 (a) Prove that $\lim_{x\to 0} \frac{a^x - 1}{x} = \log_e a$

(b) Find the derivative of $(x+4)^{\frac{1}{3}}$ w.r.t x by definition.

Q # 3 (a) Evaluate: $\int \frac{\sqrt{2}\,dx}{\sin x + \cos x}$

(b) Evaluate: $\int_{-1}^{2} \left(x + |x|\right) dx$

Q # 4 (a) The three points $A(7,-1)$, $B(-2,2)$ and $C(1,4)$ are consecutive vertices of a parallelogram. Find the fourth vertex.

(b) Graph the feasible region subject to constraints

$$2x - 3y \le 6, \quad 2x + y \ge 2, \quad x + 2y \le 8, \quad x \ge 0, \quad y \ge 0$$

Q # 5 (a) Find the equation of circle passing through points $A(3,-1)$, $B(0,1)$ and having centre at $4x - 3y - 3 = 0$.

(b) Find the equation of parabola with focus $(-3,1)$ and directrix $x - 2y - 3 = 0$.

Q # 6 (a) Find a unit vector perpendicular to the plane containing $\underline{a}$ and $\underline{b}$, also find sine of angle between then;

$$\underline{a} = 2\underline{i} - 2\underline{j} + 4\underline{k}, \qquad \underline{b} = -\underline{i} + \underline{j} - 2\underline{k}.$$

(b) Find a so that the vectors $\underline{i} - \underline{j} + \underline{k}$, $\underline{i} - 2\underline{j} - 3\underline{k}$ and $3\underline{i} - a\,\underline{j} + 5\underline{k}$ are coplanar.

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