BOARD OF INTERMEDIATE EDUCATION, KARACHI
Bakhtiari Youth Center, North Nazimabad, Karachi – 74700
http://www.facebook.com/BIEKarachi/
Website: www.biek.edu.pk

MATHEMATICS PAPER-I
(MODEL PAPER)
Annual Examination 2021
(Science Pre -Engineering & Science General Groups)

Max marks: 50 **SECTION. A. (Multiple Choice Questions)** **Time: 30 minutes**

NOTE: **This question consists 25 parts question and all are to be answered Each question carries TWO marks.**

Q.1. Select the correct answer from the given options.

(i) Let A = { 0 , 1 } , B ={ 1 , 2 } , C = { 2 , 3 } then A x (B ∩ C) =
* ϕ * { (1, 3) , (0 , 1) } * { (0 , 2) , (1 , 2) } * { (2 , 3) , (1 , 1) }

(ii) If A & B be subsets of a set U such that A ∪ B = U ,then the sets A & B are called

* Exhaustive sets * Disjoint sets * Equal sets * Unequal sets

(iii) Multiplicative inverse of z = 3 -4i is

* $\frac{3}{5}+\frac{i4}{5}$ * $\frac{3}{5}-\frac{i4}{5}$ * $\frac{3}{25}+\frac{i4}{25}$ * $-\frac{3}{5}-\frac{4}{5}i$

(iv) Factors of $4x^2 + 9y^2$ are
* (2x + i 3y) (2x - i 3y) * (2x+ 3y) (2x-3y) *$(2x + 3iy)^2$
* (4x + 9yi) (4x – 9yi)

(v) If $z_1 = 3 + 2i$ and $z_2 = 5 – 2i$, then real part of $z_1 . z_2$ is
* 4 * - 19 * - 4 * 19

(vi) If $b^2 - 4ac < 0$, then the roots of a quadratic equation are
*equal and complex * unequal and complex * equal and real
* unequal and real

(vii) The product of all cube roots of 27 is
* zero * 1 * 27 * ω

(viii) 3 is a root of an equation

* $y^2 - 5y + 6 = 0$ * $y^2 + 5y - 6 = 0$ * $y^2 + 7y + 12 = 0$ * $y^2 + 4y + 3 = 0$

(ix) If α, β are the roots of the equation $y^2 - 5y + 9 = 0$, then value of $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}}$ is

*0 * $\frac{5}{9}$ * $\frac{5}{3}$ * $\frac{9}{5}$

(x) Sum of n terms of $2, 4, 6, \ldots$ is

* $n^2 + n$ * n^2 * $\frac{n}{2}$ * $n^2 - n$

(xi) $1, x^2, 6 - x^2$ will form a G.P for x =

* 2 * 4 * 8 * $\sqrt{2}$

(xii) The H.M b/w ½ & ¼ is

* $\frac{1}{6}$ * $\frac{1}{8}$ * $\frac{1}{3}$ * $\frac{1}{5}$

(xiii) If 1/15, 1/20, 1/25 are in H.P then 15,20,25 are in

* H.P * A.P * G.P * both A.P and H.P

(xiv) How many ways can 7 persons be seated at a round table?

* 6! * 7! * ${}^7P_7$ * ${}^7C_7$

(xv) If $(a+b)^{11}$, then it will contain

*11 terms * 13 terms * 10 terms * 12 terms

(xvi) If $(a+b)^{13}$, then middle terms/middle term will be

* 7th term & 8th term *8th term & 9th term

* 7th term * 8th term

(xvii) If $(a+b)^n$; $n \varepsilon N$, then $T_{r+1} = ?$ $(r = 0,1,2,\ldots n)$

* ${}^nC_r\ a^n\ b^{n-r}$ * ${}^nC_{r+1}\ a^{n-r}\ b^r$ * ${}^nC_r\ a^{n-r}\ b^r$

* $a^{n-r}\ b^r$

(xviii) Arc length of semi circle of a unit circle is

* 2π * 3π * π * 1

(xix) $\mathbf{Sin\,2\theta =}$

$\mathbf{*\,1\,+2\,Sin^2\,\theta}$ $\mathbf{*2Cos^2\,\theta\,-\,1}$ $\mathbf{*\,Cos^2\,\theta\,+\,Sin^2\,\theta}$ $\mathbf{*\,2Sin\theta Cos\theta}$

(xx) $\mathbf{Cos\,u - Cos\,v =}$

$\mathbf{*\,2\,Cos\,\frac{u+v}{2}\,Sin\frac{u-v}{2}}$ $\mathbf{*\,2\,Sin\,\frac{u+v}{2}\,Cos\frac{u-v}{2}}$ $\mathbf{*\,2\,Cos\,\frac{u+v}{2}\,Cos\frac{u-v}{2}}$

$\mathbf{*\,-\,2\,Sin\,\frac{u+v}{2}\,Sin\frac{u-v}{2}}$

(xxi) $\text{Tan}\,(\frac{\pi}{2}+\,\theta\,) =$

$*\,-\,\text{Cot}\,\theta$ $*\,\text{Cos}\,\theta$ $*\,-\,\text{Sin}\theta$ $*\,\tan\,\theta$

(xxii)) In a ΔABC , $a = b = c$, then $\Delta =$

$*\,\frac{\sqrt{3}}{3}a$ $*\,\frac{\sqrt{3}}{2}a$ $*\,\frac{\sqrt{3}}{4}a$ $*\,\frac{\sqrt{3}}{4}a^2$

(xxiii) In a ΔABC , if angle A is at standard position , then Law of cosine

$*\,a^2=b^2+c^2\,-\,bc\,\text{Cos}\alpha$ $*\,a^2=b^2+c^2\,+2bc\,\text{Cos}\alpha$ $*\,b^2=a^2+c^2\,-\,bc\,\text{Cos}\alpha$

$*\,a^2=b^2+c^2\,-\,2bc\,\text{Cos}\alpha$

(xxiv) In any ΔABC $\text{Sin}\,\frac{\alpha}{2}=\ldots..$

$*\,\sqrt{\frac{(s-b)(s-c)}{bc}}$ $*\,\sqrt{\frac{(s-a)(s-b)}{ab}}$ $*\,\sqrt{\frac{(s-a)(s-c)}{ac}}$ $*\,\frac{\Delta}{s-a}$

(xxv)) **If** $\mathbf{Sinx = \frac{1}{2}}$ **, then** $\mathbf{x =}$

$\mathbf{*\,\frac{\pi}{3}\,,\,\frac{2\pi}{3}}$ $\mathbf{*\,\frac{\pi}{6},\frac{5\pi}{6}}$ $\mathbf{*\,\frac{\pi}{2},-\frac{\pi}{2}}$ $\mathbf{*\,\frac{\pi}{4},\frac{-\pi}{4}}$

TIME: One and half hours **MARKS: 50**

SECTION. B.
SHORT -ANSWER QUESTIONS (30 Marks)

Note : Answer any six part questions from this section ,selecting two parts questions from each question.

Complex Number and Algebra

Q.2. (i) Solve the complex equation $(x + 2y\, i)^2 = x\, i$

(ii) Show that $1 + i$ and $1 - i$ satisfy the equation $z^2 - 2z + 2 = 0$

(iii) Find all the cube roots of 125, also show that their sum is zero and their product is 125.

(iv) If α , β are the roots of $8x^2 - 6x + 3 = 0$, form an equation whose roots are $\alpha - 3$, $\beta - 3$.

Q.3. (i) If ${}^{n}P_3 = 12\ {}^{\frac{n}{2}}P_3$, find n .

(ii) The 2^{nd} , 31^{st} and the last term of an A.P are $\frac{31}{4}, \frac{1}{2}$ and $\frac{-13}{2}$ respectively. Find the number of terms.

(iii) Find the sum of the 1^{st} n terms of $5 + 55 + 555 + \ldots\ldots\ldots$

(iv) Prove by mathematical induction

$1^2 + 3^2 + 5^2 + \ldots\ldots\ldots\ldots\ldots (2n-1)^2 = \frac{1}{3} n (2n-1)(2n+1)$, $\forall\ n \in N$.

Trigonometry

Q.4. (i) If a point on the rim of a 16 cm diameter fly wheel travels 7000 meters in a minute , through how many radians does the wheel turn in two seconds.

(ii) Prove that $1 + \cot^2 \frac{\pi}{3} = \text{Cosec}^2 \frac{\pi}{3}$

(iii) For any triangle ABC , Derive law of tangent

OR

For any triangle ABC $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

(iv) Solve $2\,\text{Sin}^2 x + 2\sqrt{2}\,\text{Sin}\, x - 3 = 0$

SECTION . C .(DETAILED-ANSWER QUESTIONS) (20 Marks)

Note : Attempt any two questions from this sectioon

Q.5. (i) Which term of the H.P $6, 2, \frac{6}{5}, \ldots\ldots$ is equal to $\frac{2}{33}$?

(ii) Find the term independent of x in $\left(\sqrt{x} - \frac{2}{x^2}\right)^{10}$

OR

Find the middle term in the expansion of $\left(\frac{a}{y}-\frac{y}{a}\right)^{12}$

Q.6. (i) Three points A, B , C form a triangle such that ratio of the measure of their angles is 1 : 2 : 3 , find the ratio of length of the sides.

(ii) Solve the system of the equations

$x + y = 5$, $\frac{3}{x}+\frac{2}{y} = 2$

Q.7. (i) Prove that (any two)

(a) $\text{Cos}4x = 8\,\text{Cos}^4 x - 8\,\text{Cos}^2 x + 1$

(b) $\frac{Sin\theta + Sin\varphi}{Sin\theta - Sin\varphi} = \frac{\tan\frac{\theta+\varphi}{2}}{tan\frac{\theta-\varphi}{2}}$ (c) $\frac{Sin3\theta}{Sin\theta} - \frac{Cos3\theta}{Cos\theta} = 2$

(ii) The measure of the two sides of a triangle are 4 and 5 units. Find the third side so that the area of the triangle is 6 square units.

OR

In the expansion of $(x^2+\frac{1}{x})^m$; $m \in N$, the binomial coefficients of the fourth and the thirteenth terms are equal to each other, find the eleventh term.