Lahore Board - Annual 2010 Group I

Mathematics Paper-I(Obj), Time Allowed: 30 Mints

Max. Marks: 20 , Available online @ http://www.mathcity.org/fsc

Q.1 Four possible answers to each statement are given below. Tick (✓) the correct answer

- (1) Trichotomy is property of:
  (a) In-equality (b) Equality
  (c) Division (d) Subtraction

- (2) The multiplicative inverse of $\left(\sqrt{2},-\sqrt{5}\right)$ is:
  (a) $\left(\frac{\sqrt{2}}{\sqrt{7}},\frac{\sqrt{5}}{\sqrt{7}}\right)$ (b) $\left(\frac{\sqrt{2}}{7},\frac{-\sqrt{5}}{7}\right)$
  (c) $\left(\frac{\sqrt{2}}{7},\frac{\sqrt{5}}{7}\right)$ (d) $\left(\frac{-\sqrt{2}}{7},\frac{-\sqrt{5}}{7}\right)$

- (3) If $A\cap B=\phi$ then $n(A-B)$ is equal to
  (a) $n(A)$ (b) $n(A\cap B)$
  (c) $n(B)$ (d) $n(A\cup B)$

- (4) The contra positive of the conditional $p\to q$ is :
  (a) $q\to p$ *(b)* $\sim q\to\sim p$
  (c) $\sim p\to\sim q$ *(d)* $\sim q\to p$

- (5) For matrix equation $\begin{bmatrix}3 & 1\\ -3 & 3y-4\end{bmatrix}=\begin{bmatrix}3 & 1\\ -3 & 2\end{bmatrix}$ the value of y = _____:
  (a) 1 (b) 2
  (c) 3 (d) 4

- (6) The roots of the equation $x^2+px+q=0,$ are additive inverse of one another, then:
  (a) *p = 1* (b) *q = 1*
  (c) *q = 0* (d) *p = 0*

- (7) The partial fraction of $\frac{1}{(x-1)^2(x+1)}$ is of the form:
  (a) $\frac{A}{x+1}+\frac{B}{(x-1)^2}$ (b) $\frac{A}{x+1}+\frac{B}{x-1}+\frac{C}{(x+1)^2}$
  (c) $\frac{A}{x-1}+\frac{Bx+C}{(x-1)^2}$ (d) $\frac{A}{x+1}+\frac{Bx+C}{x-1}+\frac{Dx+F}{(x-1)^2}$

- (8) If $a_{n-2}=3n-11,$ then 5^{th} term is:
  (a) 4 (b) 7
  (c) 10 (d) 13

- (9) Let $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ be H.M between a and b, then:
  (a) $n=0$ (b) $n=1$
  (c) $n=\frac{1}{2}$ (d) $n=-1$

- (10) 5 keys can be arranged in a circular ring in number of ways:
  (a) 24 (b) 12
  (c) 6 (d) 5

- (11) A die is rolled once. The probability that the dots on the top are greater than four is :
  (a) $\frac{1}{2}$ (b) $\frac{1}{3}$
  (c) $\frac{1}{4}$ (d) $\frac{1}{6}$

- (12)The in-equality $3^n < n!$,holds for positive integral values of n if:

  (a) n > 2 (b) n > 3
  (c) n > 4 (d) n > 6

- (13) The numbers of terms in the expansion of $(2a+b)^{13}$ are:

  (a) 12 (b) 13
  (c) 14 (d) 15

- (14) The expansion of $(1+2x)^{-3}$ is valid only if:

  (a) $|x|<2$ *(b)* $|x|<\frac{1}{2}$
  (c) $|x|<\frac{1}{3}$ *(d)* $|x|<\frac{1}{6}$

- (15) 3 radian is equal to in degree:

  (a) 169.78° (b) 171.888°
  (c) 170.889° (d) 171.5°

- (16) $Sin\left(3\frac{\pi}{2}+\theta\right)$=:

  (a) $\cos\theta$ (b) $-\cos\theta$
  (c) $\sin\theta$ (d) $-\sin\theta$

- (17) Domain of $\cot\theta$ = :

  (a) $-\infty<\theta<\infty, \theta\neq n\pi$ (b) $-\infty<\theta<\infty, \quad \theta\neq\left(\frac{2x+1}{2}\right)\pi$
  (c) $-1\le\theta\le 1$ (d) $\theta\ge 1 or \theta\le -1$

- (18) Circum radius R (in usual notation):

  (a) $\frac{\Delta}{abc}$ (b) $\frac{abc}{\Delta}$
  (c) $\frac{\Delta}{s}$ (d) $\frac{a}{2\sin\alpha}$

- (19) The value of $\tan^{-1}\left(-\sqrt{3}\right)$ is :

  (a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$
  (c) $\frac{\pi}{6}$ (d) $\frac{5\pi}{6}$

- (20) Solution of the equation $\cos x-1=0 in [0,2\pi]$ is:

  (a) $\{0,\pi\}$ (b) $\{0,2\pi\}$
  (c) $\left\{0,\frac{\pi}{2}\right\}$ (d) $\left\{\frac{\pi}{3},\frac{3\pi}{2}\right\}$

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Mathematics Paper-I(Sub), Time Allowed: 2:30 Hours
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Section – I

Note: *Write any Twenty-Five (25) short answers. While writing answer write its part number carefully. Each part carries two marks.* 50

Q # 2:

(i) Write the closure law of multiplication and commutative law of addition in the set of real numbers.

(ii) Express the complex number $1+i\sqrt{3}$ in polar form.

(iii) Define inductive and deductive logic.

(iv) From suitable properties of union and intersection deduce the result $A\cap(A\cup B)=A\cup(A\cap B)$

(v) If G is a group under the operation $*$ and $a,b\in G$, find the solution of the equation $a*x=b$

(vi) For $A=\{1,2,3,4\}$, find the relation in A if $A=\{(x,y)\,|\,y=x\}$

(vii) Write any two properties of determinants.

(viii) If A and B are square matrices of the same order then explain why in general $(A+B)^2\neq A^2+2AB+B^2$

(ix) If $A=\begin{bmatrix}1\\1+i\\i\end{bmatrix}$, find $A(\overline{A})^t$

(x) State factor theorem.

(xi) If α,β are roots of $x^2-px-p-c=0$, prove that $(1+\alpha)(1+\beta)=1-c$

(xii) Solve the equation $x^{-2}-10=3x^{-1}$

(xiii) Find two consecutive numbers, whose product is 132.

(xiv) Which term of A.P 5, 2, -1 … is -85?

(xv) The sum of three numbers in an A.P is 24 and their product is 440. find the numbers.

(xvi) Sum to n terms, the series .2 + .22 + .222 + …

(xvii) If 5 is H.M between 2 and b, then find b

(xviii) How many words can be formed using all letters of the word 'PLANE' no letter is to be repeated?

(xix) Find the number of the diagonals of a 6 sided figure.

(xx) A die is rolled. Find the probability that the top shows 3 or 4 dots.

(xxi) If a sample space = {1, 2, 3, …, 9}, Event A = {2, 4, 6, 8} and Event $B=\{1,3,5\}$, then find $P(A\cup B)$

(xxii) Prove by Mathematical Induction that for all positive integer n 5^n-2^n is divisible by 3

(xxiii) Find the fifth term in the expansion of $\left(\frac{3}{2}x-\frac{1}{3x}\right)^{11}$

(xxiv) Calculate $(0.97)^3$ by means of binomial theorem.

(xxv) Expand $(8-5x)^{\frac{-2}{3}}$ up to three terms.

(xxvi) Using usual notations find 'r' when $l=5cm;\vartheta=\frac{1}{2}$ radians.

(xxvii) Verify that $\sin^2\frac{\pi}{6}+\sin^2\frac{\pi}{3}+\tan^2\frac{\pi}{4}=2$

(xxviii) Without using tables, evaluate $\cot(-855^0)$

(xxix) Prove that $\frac{\sin 2\alpha}{1+\cos 2\alpha}=\tan\alpha$

(xxx) Express $\cos 12^0+\cos 48^0$ as product.

(xxxi) Write down the domain and range of $y = \cos x$

(xxxii) Find the period of $\sin\frac{x}{5}$

(xxxiii) Find the unknown angles and sides of the right angled triangle in which $\gamma = 90^0 ; \beta = 50^0 10' ; c = 0.832$

(xxxiv) Find the greatest angle of the triangle if sides of the triangle are 16, 20, 33

(xxxv) Find the area of the triangle ABC if $a = 48 ; \alpha = 83^0 42' ; \gamma = 37^0 12'$

(xxxvi) Solve $\cot\theta = \frac{1}{\sqrt{3}}$ *if* $\theta \in [0, 2\pi]$

(xxxvii) Solve the equation $\sin 2x = \cos x \, in [0, 2\pi]$

Section - II

***Note:** Attempt any THREE questions.*

Q # 3 (a) Find A^{-1} *if* $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 0 & -1 & 1 \end{bmatrix}$ 5

(b) Show that roots of $(mx + c)^2 = 4ax$ will be equal if $c = \frac{a}{m}, m \neq 0$ 5

Q # 4 (a) Resolve $\frac{9x - 7}{(x^2 + 1)(x + 3)}$ in to partial fraction. 5

(b) Show that the sum of *n* A.Ms. between *a* and *b* is equal to n times their A.M. 5

Q # 5 (a) Find the values of n and r when ${}^nC_r = 35 \, and \, {}^nP_r = 210$ 5

(b) Find the coefficient of x^5 in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$ 5

Q # 6 (a) If $\tan\theta = \frac{1}{\sqrt{7}}$ and terminal arm of the angle is not in the III rd quadrant find the values of $\frac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta}$ 5

(b) Reduce $\sin^4\theta$ to an expression involving only function of multiple of θ raised to first power. 5

Q # 7 (a) Prove that using usual notation $r = s\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$ 5

(b) Prove that $\sin^{-1}\frac{77}{85} - \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{15}{17}$ 5

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