MODEL PAPER "MATHEMATICS"

Intermediate Part-I Examination

OBJECTIVE

Time: 30 Minutes **Marks: 20**

Note: Write answers to the questions on the objective answer sheet provided. You have four choices for each objective type question as A, B, C, and D. The choice which you think is correct; fill the circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling to or more circles will result in zero mark in that question. Attempt as many question as given in objective-type question paper and leave others blank.

(i) The no. $\frac{22}{7}$ is called a:

(a) rational no. (b) irrational no. (c) integer (d) none of these

(ii) The set {(a,b)} is called:

(a) infinite set (b) singleton set (c) set with two elements (d) empty set

(iii) A square matrix A is a skew hermitian if $(\bar{A})^t$ is equal to:

(a) A (b) -A (c) $\bar{A}$ (d) A^t

(iv) If the matrices A and B are conformable for multiplication, then $(AB)^t =$

(a) AB (b) BA^t (c) A^tB^t (d) B^tA^t

(v) If the roots of the quad equation $ax^2 + bx + c = 0$ are real and equal then

(a) $b^2 - 4ac > 0$ (b) $b^2 - 4ac = 0$ (c) $b^2 - 4ac < 0$ (d) none of these

(vi) The product of the four fourth roots of unity is:

(a) 0 (b) 1 (c) -1 (d) i

(vii) Partial fraction of $\frac{1}{(x+1)(x^2-1)}$ will be of the form:

(a) $\frac{A}{x+1} + \frac{Bx+c}{x^2-1}$ (b) $\frac{A}{x+1} + \frac{B}{x^2-1}$

(c) $\frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{(x+1)^2}$ (d) none of these

(viii) Arithmetic mean between 2a and 2b is:

(a) $\frac{a+b}{2}$ (b) $a+b$ (c) $\frac{2ab}{a+b}$ (d) none of these

(ix) The sum of an infinite geometric series exists if:

(a) $|r| < 1$ (b) $|r| > 1$ (c) $r = 1$ (d) $r = -1$

(x) $\sum_{k=1}^{n} K^2$ is equal to:

(a) $\frac{n(n+1)}{2}$ (b) $\frac{n^2(n+1)^2}{4}$

(c) $\frac{n(n+1)(2n+1)}{6}$ (d) none of these

(xi) If A and B are disjoint events then $P(A \cup B) =$

(a) $P(A)+P(B)$ (b) $P(A)-P(B)$

(c) $P(A)-P(B)-P(A \cap B)$ (d) none of these

(xii) If ${}^{n}C_8 = {}^{n}C_{12}$, then $n =$

(a) 4 (b) 8 (c) 20 (d) 12

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

(a) $|x| < \frac{1}{2}$ (b) $|x| < 1$ (c) $|x| < 2$ (d) none of these

(xiv) In one hour, the hour hand of a clock turns through:

(a) $\frac{\pi}{8}$ radians (b) $\frac{\pi}{4}$ radians (c) $\frac{\pi}{6}$ radians (d) $\frac{\pi}{2}$ radians

(xv) $\sin(2\theta) =$

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

(xvi) Period of $\sin\frac{x}{3}$ is:

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

(xvii) If ΔABC is right angle triangle, then the law of cosines reduces to:

(a) The law of sines (b) The law of tangents

(c) The pythagorus theorem (d) none of these

(xviii) Radius of escribed circle opposite to the vertex A is:

(a) $\frac{\Delta}{a}$ (b) $\frac{\Delta}{b}$ (c) $\frac{\Delta}{s-a}$ (d) none of these

(xix) The domain of the principal tan function is:

(a) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ (b) $(0, \pi)$ (c) R (d) noen of these

(xx) The solution of the equation $\tan x = -\frac{1}{\sqrt{3}}$ is in:

(a) I and II quadrants (b) I and III quadrants

(c) II and IV quadrants (d) none of these

MODEL PAPER "MATHEMATICS"

Intermediate Part-I Examination

SUBJECTIVE
SECTION – I

Time: 2:30Hours **Marks: 80**

Note: Out of Questions Nos.1,2,3, and 4 write any 25(Twenty five) short answers. While writing answer write question No. carefully.

Q.No.1. Write short answers. **(25x2)=50**

(i) Find multiplicative inverse of (-4, 7)

(ii) Define a complex number.

(iii) Define a semi-group.

(iv) Show that the statement $(p \wedge q) \rightarrow p$ is a tautology.

(v) Show B – A by Venn diagram when A and B are overlapping Sets?

(vi) if $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 2 & -1 \\ -1 & 3 & 2 \end{bmatrix}$ show that $A + A^t$ is symmetric.

(vii) Without expansion verify that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

(viii) Define the rank of a matrix.

(ix) Define a polynomial function and degree of polynomial.

Q.No.2. Write short answers.

(i) Show that $1 + w^{37} + w^{38} = 0$

(ii) When polynomial $x^3 + 2x^2 + kx + 4$ is divided by $x - 2$, the remainder is 14. Find t value of k.

(iii) If α, β are the roots of $5x^3 - x - 2 = 0$, form an equation whose roots are $\frac{3}{\alpha}, \frac{3}{\beta}$.

(iv) Resolve $\frac{2}{x^2 - 1}$ into partial fractions.

(v) What is a proper rational fraction?

(vi) Which term of the A.P. 5,2-1,.....is-85

(vii) If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in G.P. show that common ratio is $\pm\sqrt{\frac{a}{c}}$

(viii) If $a_{n-3} = 2n - 5$, find the nth term of the sequence.

(ix) How many terms of the series -9 -6 – 3 + 0 + ... amount to 66.

Q.No.3. Write short answers.

(i) If 5 is the H.M. between 2 and b then find b.

(ii) Find the number of diagonals of a six sided figure.

(iii) How many arrangements of the letters of the word PAKPATTAN taken all at time can be made.

(iv) A ball contains 40 balls out of which 5 are green, 15 are black and the remaining are yellow. A ball is taken out of the bag. Find the probability that the ball is yellow.

(v) State principle of mathematical induction.

(vi) Expand $(1 + 2x)^{-1}$ up to 3 terms.

(vii) Define an angle.

(viii) Prove that $l = r\theta$

(ix) Define a radian.

Q.No.4. Write short answers.

(i) Prove that $\operatorname{cosec}\theta + \tan\theta \sec\theta = \operatorname{cosec}\theta + \sec^2\theta$

(ii) Prove that $\dfrac{\cos 11^0 + \sin 11^0}{\cos 11^0 - \sin 11^0} = \tan(56^0)$

(iii) Express $\sin 7x + \sin 5x$ as a product.

(iv) Draw the graph of $y = \cos x$ from -90^0 to 90^0

(v) What do you mean by the solution of a triangle?

(vi) State any two laws of cosines in a triangle.

(vii) Prove that $r = \dfrac{\Delta}{S-a}$.

(viii) Find the area of a triangle ABC in which b=21.6cm, c=30.2m, and $\alpha = 52^0 40'$

(ix) Prove that $\tan^{-1}\dfrac{1}{4} + \tan^{-1}\dfrac{1}{5} = \tan^{-1}\left(\dfrac{9}{19}\right)$

(x) Find the solution set of the equation $\sin x = \dfrac{1}{2}$

SECTION – II

Note: Attempt any THREE questions. All questions carry equal marks.

Q.No.5. (a) If a, b are elements of a group G then show that $(ab)^{-1} = b^{-1}a^{-1}$

(b) Show that $\begin{vmatrix} a+l & a & a \\ a & a+l & a \\ a & a & a+1 \end{vmatrix} = l^2 (3a+l)$

Q.No.6. (a) Prove that $\dfrac{x^2}{a^2} + \dfrac{(mx+c)^2}{b^2} = 1$ has equal roots, if

$c^2 = a^2m^2 + b^2, a \neq 0, b \neq 0$

(b) Find 'n' so that $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be H.M. between a and b.

Q.No.7. (a) Prove that ${}^{n-1}C_r + {}^{n-1}C_{r-1} = {}^nC_r$

(b) Use mathematical induction to prove that $x+y$ is a factor of $x^{2n-1} + y^{2n-1}, (x \neq -y)$

Q.No.8. (a) Find the values of the trigonometric functions of the angle $\dfrac{235}{2}\pi$.

(b) Prove that $\cos 20^0 . \cos 40^0 . \cos 60^0 . \cos 80^0 = \dfrac{1}{16}$

Q.No.9. (a) Define inscribed circle and prove that $r = \dfrac{\Delta}{S}$.

(b) Prove that $\sin^{-1}\left(\dfrac{77}{85}\right) - \sin^{-1}\left(\dfrac{3}{5}\right) = \cos^{-1}\left(\dfrac{1}{7}\right)$