Total No. of Questions : 23]

(Graph Paper)

[Total No. of Printed Pages : 12

SS

2037

ਸਲਾਨਾ ਪਰੀਖਿਆ ਪ੍ਰਨਾਲੀ

MATHEMATICS

(Common for Humanities, Sc. & Agri. Groups)

Time allowed : Three hours

Maximum marks : 90

(English Version)

Note : *(i) You must write the subject-code/paper-code* **028/B** *in the box provided on the title page of your answer-book.*

(ii) Make sure that the answer-book contains 30 pages (including title page) and are properly serialed as soon as you receive it.

(iii) Question/s attempted after leaving blank page/s in the answer-book would not be evaluated.

(iv) ***All questions are compulsory.***

(v) Use of calculator is not allowed but Log Tables can be used.

(vi) Q. **1** *will consist of 10 parts and each part will carry 1 mark.*

(vii) Q. **2** *to Q.* **9** *each will be of 2 marks.*

(viii) Q. **10** *to Q.* **19** *each will be of 4 marks.*

(ix) Q. **20** *to Q.* **23** *each will be of 6 marks.*

(x) Graph paper is attached with the question paper.

(xi) Punjabi and Hindi versions of questions are translations of English version. So in the case of any confusion consider English version to be correct.

(xii) Question number **12, 18, 19, 20, 21, 22** *and* **23** *contain internal choice.*

PUNJAB BOARD CLASS 12 MATHS (B)
PREVIOUS YEAR PAPER- 2017

1. (i) If a binary operation is defined by $a * b = a^b$ then $2 * 2$ is equal to :

(a) 4 (b) 2 (c) 9 (d) 8 1

(ii) $\sin^{-1}(1)$ is equal to :

(a) 0 (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{3}$ 1

(iii) If order of matrix A is 4×3 and order of matrix B is 3×5 then order of matrix $B'A'$ is :

(a) 5×2 (b) 4×5 (c) 5×4 (d) 3×2 1

(iv) If $f(x) = \begin{cases} mx - 1, & x \leq 5 \\ 3x - 5, & x > 5 \end{cases}$ is continuous then value of m is :

(a) $\frac{11}{5}$ (b) $\frac{5}{11}$ (c) $\frac{5}{3}$ (d) $\frac{3}{5}$ 1

(v) If $y = \cos x$ then at $x = \frac{\pi}{2}$, y_2 is equal to :

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

(vi) $\int_0^{\pi/2} \frac{\sin^{3/2} x}{\sin^{3/2} x + \cos^{3/2} x} dx$ is equal to :

(a) 0 (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$ 1

PUNJAB BOARD CLASS 12 MATHS (B)
PREVIOUS YEAR PAPER- 2017

(vii) Order of differential equation $\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^3+3y=0$ is :

(a) 3 (b) 2 (c) 0 (d) 1 — 1

(viii) If $\sqrt{3}\,\vec{a}\cdot\vec{b}=|\vec{a}\times\vec{b}|$ then angle between vector $\vec{a}$ and vector $\vec{b}$ is :

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$ — 1

(ix) Direction ratio of line given by $\frac{x-1}{3}=\frac{6-2y}{10}=\frac{1-z}{-7}$ are :

(a) $<3, 10, -7>$ (b) $<3, -5, 7>$

(c) $<3, 5, 7>$ (d) $<3, 5, -7>$ — 1

(x) If $P(A)=\frac{1}{2}$, $P(B)=\frac{3}{8}$ and $P(A\cap B)=\frac{1}{5}$ then $P(B\,|\,A)$ is equal to :

(a) $\frac{2}{5}$ (b) $\frac{8}{15}$ (c) $\frac{2}{3}$ (d) $\frac{5}{8}$ — 1

2. If $A=\begin{bmatrix}2\\-4\\1\end{bmatrix}$, $B=\begin{bmatrix}5 & 3 & -1\end{bmatrix}$ then verify that $(AB)'=B'A'$. — 2

3. If $y=\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ then find $\frac{dy}{dx}$. — 2

4. Evaluate $\int \sin^4 x\cos^3 x\,dx$. — 2

5. Evaluate $\int \frac{dx}{x^2-4x+13}$. — 2

6. Find particular solution of differential equation $\cos\left(\frac{dy}{dx}\right)=\frac{1}{5}$, $y(0)=2$. — 2

7. Find the integrating factor for the differential equation $\cot x\frac{dy}{dx}+y=2x+x^2$. — 2

8. Find the angle between plane $3x+4y-z=8$ and line $\frac{x-1}{2}=\frac{2-y}{7}=\frac{3z+6}{12}$. — 2

9. Probabilities of A, B and C of solving a problem are 1/3, 1/2 and 1/4 respectively. If they all try to solve the problem then find the probability that exactly one of them will solve the problem. — 2

PUNJAB BOARD CLASS 12 MATHS (B)
PREVIOUS YEAR PAPER- 2017

10. Show that function f: R → R, f(x) = $\frac{2x+5}{8}$ is invertible. Also find the inverse of f. 4

11. Show that : $tan^{-1}\frac{1}{3}+ : tan^{-1}\frac{1}{5}=\frac{1}{2}\ cos^{-1}\frac{33}{35}$ 4

12. Express $\begin{bmatrix} 6 & -4 & 5 \\ 1 & 4 & -2 \\ 7 & 5 & 9 \end{bmatrix}$ as sum of symmetric matrix and a skew-symmetric matrix. 4

Or

Show that:

$$\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = xyz\left(1+\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$$

13. If y=$(\sin x)^x$ +$(x)^{sinx}$ then find $\frac{dy}{dx}$ 4

14. Using differentials find approximate value of $\sqrt{360}$. 4

15. Evaluate $\int_1^3 (x^2+4)dx$ as limit of a sum. 4

16. Using integration find the area of triangle whose sides are given by the equations y= x+1, y=3x+1, x=5. 4

17. Find the particular solution of differential equation x^2dy-($3x^2$+xy+ y^2) dx=0, y(1)=1 4

18. Adjacent sides of a parallelogram are given by the vectors $2\hat{i}-\hat{j}+2\hat{k}$ and $i-5\hat{j}-\hat{k}$ 4

Or

Vectors $\vec{a}=3\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=\hat{i}-\hat{j}+2\hat{k}$ and $\vec{c}=2\hat{i}-\hat{j}-\hat{k}$ are given. Find the vector $\vec{d}$ if $\vec{d}$ is perpendicular to $\vec{c}$ and $\vec{d}$. $\vec{a}$=10, $\vec{d}$.$\vec{b}$=1

PUNJAB BOARD CLASS 12 MATHS (B)
PREVIOUS YEAR PAPER- 2017

19. Bag I contains 2 black and 8 red balls, bag II contains 7 black and 3 red balls and bag III contains 5 black and 5 red balls. One bag is chosen at random and a ball is drawn from it which is found to be red. Find the probability that the ball is drawn from bag II. 4

or

Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find probability distribution and mean of number of cards numbered 4. 4

20. Solve the following system of linear equations by matrix method :

$3x+y+z=10, 2x-y-z=0, x-y+2z=1$ 6

or

Using elementary transformations find the inverse of $\begin{bmatrix} 3 & 2 & 1 \\ 2 & 4 & 3 \\ 2 & -1 & 2 \end{bmatrix}$. 6

21. Show that the height of the cylinder of maximum volume that can be inscribed in a sphere of radius 20 cm is $\frac{40}{\sqrt{3}}$ cm. Also find the maximum volume. 6

or

A wire of length 25 cm is to be cut off into two pieces. One piece is to be made into a circle and other into a square. What should be the lengths of two pieces so that combined area of circle and square is minimum? 6

22. Find the shortest distance between the lines :

$\frac{x+1}{4}=\frac{y-3}{-6}=\frac{z+1}{1}$ and $\frac{x+3}{3}=\frac{y-5}{2}=\frac{z-7}{6}$ 6

Or

Find the image of the point (5, -3,1) in the plane 2x-2y<3z=10. 6

23. Maximize $Z=12x+24y$ subject to the constraints $x+y \geq 5$, $5x+7y \leq 35$, $x-y \geq 0$, $x,y \geq 0$ graphically. 6

Or

One kind of cake require 300 gm of flour and 15 gm of fat and another kind of cake requires 150gm of flour and 30gm of fat. Find the maximum number of cakes that can be made from 7.5kg of flour and 600gm of fat. From a linear programming problem and solve it graphically. 6