Model Quesiton – 5

Subject : Mathematics XII (Mat. 402/008)

Time : 3 hrs **F.M. 75**

Attempt all the questions:

Group "A"

Rewrite the correct option in your answer sheet: **11X1=11**

1) For what value of p will be the equation $5x^2 - px + 45 = 0$ have equal roots?

a. 30 b. -30 c. both a and b d. none

2) If C (21, 2r+1) = C (21, 3r-5) then the value of r will be

a. 5 b. 6 c. 5 or 6 d. 7

3) If $\cos^{-1} x + \cos^{-1} y = \frac{\pi}{2}$ then $x^2 + y^2 =$

a. 2 b. 3 c. 4 d. 1

4) The eccentricity of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ is

a. $\frac{3}{5}$ b. $\frac{5}{3}$ c. $\frac{\sqrt{3}}{2}$ d. $\sqrt{3}$

5) The distance between two parallel plane 2x-2y+z+1=0 and 4x – 4y+ 2z+3 = 0 is

a. $-\frac{1}{6}$ b. $\frac{1}{6}$ c. 2 d. $\frac{1}{2}$

6) The area of parallelogram determine by the vectors $-3\vec{i}-2\vec{j}+\vec{k}$ and $\vec{i}+2\vec{j}+3\vec{k}$ is

a. 6 b. $6\sqrt{5}$ c. $5\sqrt{6}$ d. none

7) The correlation coefficient between two variables lies between

a. -1 to 1 b. -2 to 2 c.0 to 1 d. none

8) The derivative of $e^{\tan x}$ is

a. $e^{\tan x}$ b. $\frac{e^{\tan x}}{\sec^2 x}$ c. $\sec^2 e^{\tan x}$ d. none

9) The solution of the differential equation $x\,dy = -y\,dx$ is

a. x/y = c b. xy = c c. x + y = c d. xy = 0

10) When will be the system of linear equations consistent?

a. It has unique solution.
b. It has infinitely many solution.
c. Both a and b.
d. None

11) A body of mass 0.5 kg and initially at rest is subjected to a force of 2N for 1 sec then the velocity during the second is

a. $4ms^{-1}$ b. $5ms^{-1}$ c. $6ms^{-1}$ d. none

Group "B"

Short answer questions: **8X5=40**

12)

a) In how many ways "MONDAY" can be arranged. How many of these arrangements do not begin with M? How many begin with M and do not end with Y? 3

b) Solve the following equation using Cramer's rule: $\frac{3}{x}+\frac{2}{y}=\frac{19}{20}$ and $\frac{4}{x}+\frac{10}{y}=2$ 2

13) Find the general term and then the sum of first in terms of the series:

$1.2^2 + 3.4^2 + 5.6^2 + \ldots\ldots\ldots$ 5

14)

a) Solve: cos3 x + cos x = cos 2x. 3

b) Find the co-ordinates of the point where the line through the points (5, 6, 1) and (5, 1, 6) crosses the xy – plane 2

15)

a) Find the regression equation x on y from the following data: 3

x	5	9	13	17	21
y	3	8	13	18	23

b) If 20% of bulbs produce by a machine are defective, determine the probability that out of 4 bulbs choosen random that one is defective. 2

16) Integrate: $\int \frac{dx}{(x-1)^2(x-2)^3}$ 5

17) Solve: $(1+x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$ 5

18) Using Simplex method, solve the LP problem

Max U = 25x + 45y

S.t. $x + 3y \leq 21$

$2x + 3y \leq 24$ $x, y \geq 0$ 5

19)

a) A particle is projected with a velocity u. if the greatest height attained by the particle be H, prove that the range R on the horizontal plane through the point of projection is $R = 4\sqrt{H\left(\frac{u^2}{2g} - H\right)}$ 3

b) Two paralle forces of 30 kg wt and 20 kg wt are acting at a distance 40 cms apart. Find their resultant if forces are like. 2

Group "C"

Long answer questions: **3X8=24**

20)

a) If the three consecutive coefficients in a expansion of $(1+x)^n$ be 165, 330, 462. Find n. 4

b) Use the row-equivalent matrices to solve the system

x + y + z = 1

x + 2y + 3z = 4

x + 3y + 7z = 13 4

21)

a) Using vector method, prove that:

Sin (A-B) = sin A. cosB – cos A. sinB 5

b) Deduce the equation to the hyperbola in the standard forms in with focus at (-5, 0) and a vertex at (2, 0) 3

22)

a) State Mean value theorem with geometrical meaning and verify for the function f(x) = (x-1) (x-2) (x-3) in [1, 4] 6

b) Find the derivative of $x^{\cos h\, x/a}$ 2

Answers:

Group A

1) (c)	2) (c)	3) (d)	4) (b)

5) (b)	6) (b)	7) (a)	8) (b)
9) (b)	10) (c)	11) (a)	

Group B

12) (a) 720, 600, 96 (b) (-3, 2)

13) $(2n-1)(2n)^2,\ \frac{2}{3}n(n+1)\left(3n^2+n-1\right)$

14)

(a) $x=(2n+1)\frac{\pi}{4},\ 2n\pi\pm\frac{\pi}{3}$ (b) (5, 7, 0)

15)

(a) x = 0.8 y + 2.6 (b) 0.4096

16) $-\frac{1}{2}\left(\frac{x-1}{x-2}\right)^2+3\left(\frac{x-1}{x-2}\right)-3\log\left(\frac{x-1}{x-2}\right)-\frac{x-2}{x-1}+C$

17) $y=\frac{1}{2}e^{\tan^{-1}x}+ce^{-\tan^{-1}x}$

18) $Max\ U=345, x=3, y=6$

19)

(b) 16 cm apart of resultant 50 kg

Group C

20) (a) 11 (b) (1, -3, 3)

21)

(b) $21x^2-4y^2=84$

22)

b) $x^{\cosh x/a}\left[\frac{1}{x}\cosh\frac{x}{a}+\frac{1}{a}\sin h\frac{x}{a}\log x\right]$