# 311302

**12526**

**03 Hours / 70 Marks** Seat No. | | | | | | | | |

*Instructions* – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Figures to the right indicate full marks.

(4) Use of Non-programmable Electronic Pocket Calculator is permissible.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. Solve any FIVE of the following :** **10**

a) Find the value of
$\log \frac{5}{6} + \log \frac{12}{35} + \log \frac{7}{2}$

b) Without using calculator, find the value of sin 210°

c) Find the equation of the line passing through $(3, -4)$ and having slope $\frac{3}{2}$

d) If $f(x) = x^3 - 9x + 1$, find $f(2)$, $f(3)$

e) Find $\frac{dy}{dx}$ if $y = e^x . \sin x$

f) Find the slope of tangent to the curve $y = 2x - x^2$ at $(2, 0)$

g) If mean is 34.5 and standard deviation is 5, find the coefficient of variance.

P.T.O.

**Marks**

**2. Solve any THREE of the following :** **12**

a) Find $x, y, z$ if

$$\left\{\begin{bmatrix}1&3&2\\2&0&1\\3&1&2\end{bmatrix}+2\begin{bmatrix}3&0&2\\1&4&5\\2&1&0\end{bmatrix}\right\}\begin{bmatrix}1\\2\\3\end{bmatrix}=\begin{bmatrix}x\\y\\z\end{bmatrix}$$

b) If $A=\begin{bmatrix}1&-5\\6&4\end{bmatrix}$, $B=\begin{bmatrix}1&0\\0&-1\end{bmatrix}$ check whether AB is singular or non-singular.

c) Resolve into partial fractions

$$\frac{\sin\theta+1}{(\sin\theta+2)(\sin\theta+3)}$$

d) Prove that

$\tan A \cdot \tan(60-A)\cdot\tan(60+A)=\tan 3A$

**3. Solve any THREE of the following :** **12**

a) Prove that $\frac{\cos A+\cos 3A}{\sin 3A-\sin A}=\cot A$

b) Prove that

$$\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{3}{5}\right)=\tan^{-1}\left(\frac{27}{11}\right)$$

c) Find the equation of line passing through (2, 5) and the point of intersection of lines $x + y = 0$ and $2x - y = 9$

d) Find $\frac{dy}{dx}$ if $\sin y = \log(x + y)$

**4. Solve any THREE of the following :** **12**

a) If $x = a(2\theta - \sin 2\theta)$,

$y = a(1 - \cos 2\theta)$ find $\frac{dy}{dx}$ at $\theta = \pi/4$

b) Find $\frac{dy}{dx}$ if

$y = x^x + a^x + a^a$

c) Find range and coefficient of range for the following data.

| Marks | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 |
|---|---|---|---|---|---|
| No. of Students | 6 | 10 | 16 | 14 | 8 |

**Marks**

d) Find mean deviation about mean for the following data :

3, 6, 5, 7, 10, 12, 15, 18

e) The mean of runs scored by two batsmen A and B in a series of 10 innings are 50 and 12 respectively. The standard deviations of their runs are 15 and 2 respectively. Who is more consistent?

**5. Solve any TWO of the following :** **12**

a) Using matrix inversion method, solve the following equations :

$x + y + z = 3$

$x + 2y + 3z = 4$

$x + 4y + 9z = 6$

b) If A and B both are obtuse angles and $\sin A = \frac{5}{13}$, $\cos B = \frac{-4}{5}$ , then find the quadrant of angle (A + B)

c) Attempt the following :

i) Find the length of the perpendicular from the point (3, 4) on the line $3x + 4y = 7$.

ii) Find the acute angle between the lines $3x - 2y + 4 = 0$ and $2x - 3y - 7 = 0$

**6. Solve any TWO of the following :** **12**

a) A bullet is fired into a mud bank and penetrates $(120t - 3600t^2)$ meters in t seconds after impact. Calculate maximum depth of penetration.

b) Find the radius of curvature of the curve $y^2 = 4ax$ at point $(a, 2a)$

c) Find mean, standard deviation and coefficient of variance of the following data :

| Class interval | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 |
|---|---|---|---|---|---|
| Frequency | 6 | 10 | 12 | 10 | 8 |