SECOND REVISION TEST - 2025

Standard XI

Reg.No. | | | | | | |

MATHEMATICS

Time : 3.00 hrs **Part - I** *Marks : 90*

I. Choose the correct answer: **20 x 1 = 20**

1. The value of x, for which the matrix $A = \begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix}$ is singular, is :

a) 7 b) 6 c) 9 d) 8

2. Which of the following is not true about the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{bmatrix}$?

a) an upper triangular matrix b) a lower triangular matrix
c) a scalar matrix d) a diagonal matrix

3. If $|\vec{a}+\vec{b}| = 60$, $|\vec{a}-\vec{b}| = 60$ and $|\vec{b}| = 46$, then $|\vec{a}|$ is

a) 32 b) 42 c) 12 d) 22

4. If $\vec{a}$ and $\vec{b}$ included an angle 120° and their magnitudes are 2 and $\sqrt{3}$, then $\vec{a}.\vec{b}$ is is equal to

a) $-\sqrt{3}/2$ b) $\sqrt{3}$ c) $-\sqrt{3}$ d) 2

5. The value of $\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+......$ is

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

6. $\frac{\cos 6x+6\cos 4x+15\cos 2x+10}{\cos 5x+5\cos n\ 3x+10\cos x} =$

a) 2 cos x b) cos 2x c) cos x d) cos 3x

7. $\frac{1}{\cos 80^{\circ}} - \frac{\sqrt{3}}{\sin 80^{\circ}} =$

a) 4 b) $\sqrt{2}$ c) $\sqrt{3}$ d) 2

8. If $2nC_3 : nC_3 = 11 : 1$, then n is:

a) 7 b) 5 c) 6 d) 11

9. The function $f : [0, 2\pi] \rightarrow [-1, 1]$ defined by f(x) = sin x is

a) one-to-one b) onto c) bijection d) cannot be defined

10. If A = {1,2,3}, B = {1,4,6,9} and R is a relation from A to B defined by 'x' greater than 'y'. The range of R is:

a) {1,4,6,9} b) {4,6,9} c) {1} d) {2}

11. The value of $1-\frac{1}{2}\left(\frac{2}{3}\right)+\frac{1}{3}\left(\frac{2}{3}\right)^2-\frac{1}{4}\left(\frac{2}{3}\right)^3+\ldots\ldots$

a) $\log\left(\frac{5}{3}\right)$ b) $\frac{3}{2}\log\left(\frac{5}{3}\right)$ c) $\frac{5}{3}\log\left(\frac{5}{3}\right)$ d) $\frac{2}{3}\log\left(\frac{5}{3}\right)$

12. If the point (8, –5) lies on the locus $\frac{x^2}{16}-\frac{y^2}{25}=k$, then the value of k is:

a) 0 b) 1 c) 2 d) 3

13. Equation of the straight line perpendicular to the line $x-y+5=0$, through the point of intersection on the y axes and the given line:

a) $x-y-5=0$ b) $x+y-5=0$ c) $x+y+5=0$ d) $x+y+10=0$

14. The expansion of $(1-x)^{-2}$ is

a) $1-x+x^2-\ldots\ldots\ldots$ b) $1+x+x^2-\ldots\ldots$

c) $1-2x+3x^2-\ldots\ldots$ d) $1+2x+3x^2\ldots\ldots$

15. For the function $f(x)=\begin{cases}x+2, & x>0\\ x-2, & x<0\end{cases}$

a) $\lim_{x\to 2^-} f(x)=-1$ b) $\lim_{x\to 0} f(x)$ does not exist

c) $\lim_{x\to 0^-} f(x)=-1$ d) $\lim_{x\to 0^+} f(x)=1$

16. If $f(x)=x^2-3x$, then the points at which $f(x)=f'(x)$ are

a) both irrational b) one rational and another irrational

c) both positive integers d) both negative integers.

17. It is given that the events A and B are such that $P(A)=\frac{1}{4}$, $P(A/B)=\frac{1}{2}$ and $P(B/A)=\frac{2}{3}$, then P(B) is

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

18. If $x=at^2$, $y=2at$, then $\frac{dy}{dx}=$

a) $-t$ b) $\frac{1}{t}$ c) $-\frac{1}{t}$ d) t

19. $\int\left(\frac{x-1}{x+1}\right)dx=$

a) $x+2\log(x+1)+c$ b) $\frac{1}{2}\left(\frac{x-1}{x+1}\right)^2+c$

c) $x-2\log(x+1)+c$ d) $\frac{(x-1)^2}{2}\log(x+1)+c$

20. $\int 2^{3x+5}dx=$

a) $\frac{2^{3x+5}}{3\log 2}+c$ b) $\frac{3\left(2^{3x+5}\right)}{\log 2}+c$ c) $\frac{2^{3x+5}}{3\log(3x+5)}+c$ d) $\frac{2^{3x+5}}{2\log 3}+c$

Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory) **7 x 2 = 14**

21. If A = {1,2,3,4} and B = {3,4,5,6} then find $n[(A\cup B)\times(A\cap B)\times(A\Delta B)]$
22. Find the complete set of values of 'a' for which the quadratic equation $x^2 - ax + a + 2 = 0$ has equal roots.
23. Find the principal solution of $\cos\theta = -\frac{1}{2}$
24. Find the coefficient of x^5 in the expansion of $\left(x+\frac{1}{x^3}\right)^{17}$
25. Find the equation of the straight line, if the perpendicular from the origin makes an angle of 120° with x-axis and the length of the perpendicular from the origin is 6 units.
26. Define diagonal and scalar matrices.
27. Find a unit vector along the direction of the vector $5\hat{i} - 3\hat{j} + 4\hat{k}$
28. Consider the function $f(x) = \sqrt{x}$, $x \geq 0$. Does $\lim_{x\to 0} f(x)$ exist?
29. Evaluate $\int \frac{1}{\sin^2 x\cos^2 x}dx$
30. Differentiate x^x with respect to x.

Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory) **7 x 3 = 21**

31. Find the range of $f(x) = \frac{1}{1-3\cos x}$
32. If $a\sin^2\theta + b\cos^2\theta = c$, then show that $\tan^2\theta = \frac{c-b}{a-c}$
33. If $a_1, a_2, a_3, \ldots\ldots a_n$ is a geometric progression, then prove that every term $a_k (k > 1)$ is the geometric mean of its immediate predecessor a_{k-1} and immediate successor a_{k+1}
34. Find the nearest point on the line $x - 2y = 5$ from the origin.
35. If $(n+2)C_8 : (n-2)C_4 = 57:16$, find n
36. Find the value of the product $\begin{vmatrix}\log_3 64 & \log_4 3\\ \log_3 8 & \log_4 9\end{vmatrix}\times\begin{vmatrix}\log_2 3 & \log_8 3\\ \log_3 4 & \log_3 4\end{vmatrix}$
37. Show that $\vec{a}\times(\vec{b}+\vec{c})+\vec{b}\times(\vec{c}+\vec{a})+\vec{c}\times(\vec{a}+\vec{b})=\vec{0}$
38. Does the limit of the function $\frac{\sin x}{|x|}$ exist when $x\to 0$. State reasons for your answer.
39. If $y = \tan^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ then find y'
40. Evaluate $\int (x+3)\sqrt{x+2}\,dx$

Part - IV

IV. Answer all the questions. $7 \times 5 = 35$

41. a) Find the unit vectors perpendicular to each of the vectors $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$, where $\vec{a}=\hat{i}+\hat{j}+\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}+3\hat{k}$

(OR)

b) Write any five different forms of an equation of a straight line.

42. a) For the given base curve y = sin x, draw $y=\frac{1}{2}\sin 2x$

(OR)

b) Solve the equation $\sqrt{6-4x-x^2}=x+4$

43. a) State and Prove any one of the Napier's formula.

(OR)

b) Prove that for any natural number n, a^n-b^n is divisible by a – b, where a > b.

44. a) Prove that $\sqrt[3]{x^3+7}-\sqrt[3]{x^3+4}$ is approximately equal to $1/x^2$ when x is large.

(OR)

b) Evaluate : $\int \frac{2x+4}{x^2+4x+6}dx$

45. a) By the principle of mathematical induction prove that for $n \geq 1$

$$1^2+2^2+3^2+\ldots+(2n-1)^2=\frac{n(2n-1)(2n+1)}{3}$$

(OR)

b) Show that $\begin{vmatrix} 2bc-a^2 & c^2 & b^2 \\ c^2 & 2ca-b^2 & a^2 \\ b^2 & a^2 & 2ab-c^2 \end{vmatrix}=\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2$

46. a) Show that the equation $9x^2-24xy+16y^2-12x+16y-12=0$ represents a pair of parallel lines. Find the distance between them.

(OR)

b) If $y=\frac{\sin^{-1}x}{\sqrt{1-x^2}}$ then show that $(1-x^2)y_2-3xy_1-y=0$

47. a) Differentiate with respect to x : $\frac{5x-2}{2+2x+x^2}$

(OR)

b) If ABCD is a quadrilateral and E and F are the midpoints of AC and BD respectively, prove that $\overrightarrow{AB}+\overrightarrow{AD}+\overrightarrow{CB}+\overrightarrow{CD}=4\overrightarrow{EF}$

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ST. JOSEPH'S HR. SEC. SCHOOL, CHENGALPATTU
SECOND REVISION TEST - 2025
STD - 11 MATHEMATICS - KEY

C. SELVAM, M.Sc., M.Ed.,
P.G. ASST. (MATHS),
ST. JOSEPH'S HSS, CPT.

1.	d	8
2.	c	a scalar matrix
3.	d	22
4.	c	$-\sqrt{3}$
5	d	$\frac{(e-1)^2}{2e}$
6	a	$2\cos x$
7	a	4
8	c	6
9	b	onto
10.	b	{4, 6, 9}
11	b	$\frac{3}{2}\log(5/3)$
12	d	3
13	b	$x+y-5=0$
14	d	$1+2x+3x^2 \dots$
15	b	$\lim_{x\to 0}$ fun does not exist
16	a	both irrational
17.	d	$1/3$
18.	b	$1/6$
19.	c	$x-2\log(x+1)+c$
20.	a	$\frac{2^{3x+5}}{3\log 2}+c$

21. $n(A\cup B)=6$, $n(A\cap B)=2$, $n(A\Delta B)=4$
$n(A\cup B)+n(A\cap B)+n(A\Delta B)=48$

22. $D=b^2-4ac \Rightarrow a=\frac{4\pm\sqrt{48}}{2}$, $a=2\pm\sqrt{12}$

23. $\cos\theta=-1/2 \Rightarrow \cos(\pi-\pi/3)=\cos 2\pi/3$

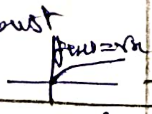
24. $17C_5\; x^{12}(1/x^3)^5$

25. $x\cos 120^\circ + y\sin 120^\circ = 6$
$x(-1/2)+y(\sqrt{3}/2)=6$
$x-\sqrt{3}y+12=0$

26. A square matrix $A=[a_{ij}]_{n\times n}$ is called a diagonal matrix if $a_{ij}=0,\ i\neq j$
A diagonal matrix whose entries along the principal diagonal are equal is called a scalar matrix

27. $\frac{\vec{a}}{|\vec{a}|}=\frac{5\hat{i}-3\hat{j}+4\hat{k}}{\sqrt{50}}$

28. $f(x)=\sqrt{x}$, $\lim_{x\to 0^-}\sqrt{x}$ does not exist
$\lim_{x\to 0^+}\sqrt{x}=0$ does not exist.



29. $=\int\frac{\sin^2x+\cos^2x}{\sin^2x\cos^2x}dx=\int\sec^2x\,dx+\int\operatorname{cosec}^2x\,dx$
$=\tan x-\cot x+c$

30. $\log y = x\log x \Rightarrow \frac{1}{y}\frac{dy}{dx}=x(1/x)+\log x$
$dy/dx = y(1+\log x)$

31. $-1\le\cos x\le 1$
$3\ge -3\cos x\ge -3$
$1-3\le 1-3\cos x\le 3+1$
$1/4\le\frac{1}{1-3\cos x}\le -1/2$
$f\in(-\infty,-1/2]\cup[1/4,\infty)$

32. RHS $=\frac{c-b}{a-c}=\frac{a\sin^2\theta+b\cos^2\theta-b}{a-a\sin^2\theta+b\cos^2\theta}$
$=\frac{a(\sin^2\theta)+b(\cos^2\theta-1)}{a(1-\sin^2\theta)+b\cos^2\theta}=\frac{\sin^2\theta}{\cos^2\theta}=\tan^2\theta=$ LHS

33. $a_k=a+(k-1)d$, $a_{k-1}=a+(k-2)d$, $a_{k+1}=a+kd$
$\frac{a_{k-1}+a_{k+1}}{2}=\frac{a+(k-2)d+a+kd}{2}=\frac{2a+(2k-2)d}{2}$
$=a+(k-1)d=a_k$

34. $x-2y=5$, $L_Y=2x+y=0$
(1)&(2) $\Rightarrow x=1,\ y=-2$

35. MA $\frac{(n+2)C_8}{(n-3)P_4}=\frac{57}{16}$

36. $\begin{vmatrix}\log_2 64+1 & \log_8 64+1\\ \log_2 8+\log_3 9 & 1+\log_3 9\end{vmatrix}=\begin{vmatrix}6+1 & 2+1\\ 3+2 & 1+2\end{vmatrix}=\begin{vmatrix}7 & 3\\ 5 & 3\end{vmatrix}$
$=21-15=6$

37. $=a\times b+a\times c+b\times c+b\times a+c\times a+c\times b$
$=a\times b+a\times c+b\times c-a\times b-a\times c-b\times c$
$=0$

38. $\lim_{x\to 0^-}f(x)=-1$, $\lim_{x\to 0^+}f(x)=+1$
$f(x)=\begin{cases}\frac{\sin(-x)}{x} & -1<x<0\\ \frac{\sin x}{x} & 0<x<1\end{cases}$
$f(0^-)\neq f(0^+)$ not exist.

39. $x=\tan\theta$
$\frac{1+x}{1-x}=\frac{1+\tan\theta}{1-\tan\theta}=\tan(\pi/4+\theta)$
$y=\pi/4+\tan^{-1}x \Rightarrow y'=\frac{1}{1+x^2}$

40. $\int(x+2-5)\sqrt{x+2}\,dx=\int(x+2)\sqrt{x+2}\,dx-5\int\sqrt{x+2}\,dx$
$\frac{2}{5}(x+2)^{5/2}-\frac{10}{3}(x+2)^{3/2}+c$

41 a. $c\times d = -2i+4j-2k$, $|c\times d| = \sqrt{24}$

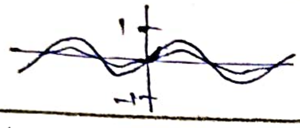
$\hat{n} = \frac{c\times d}{|c\times d|} = \frac{i-2j+k}{\sqrt{6}}$

b. 1. $y = mx+c$
2. $y-y_1 = m(x-x_1)$
3. $\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$
4. $\frac{x}{a}+\frac{y}{b} = 1$
5. $x\cos\alpha + y\sin\alpha = p$
6. $ax+by+c=0$

42 a.

x	0	90	180	270	360
$y=\sin x$	0	1	0	-1	0

x	0	90	180	270	360
$y=\frac{1}{2}\sin 2x$	0	0.5	0	-0.5	0



b. $6-4x-x^2 = x^2+16+8x$

$2x^2+12x+10=0$

$x^2+6x+5=0$

$(x+1)(x+5)=0 \Rightarrow x=-1,\ x=-5$

43 a. $\tan\frac{A-B}{2} = \frac{a-b}{a+b}\cot\frac{C}{2} = \frac{2R\sin A-2R\sin B}{2R\sin A+2R\sin B}\cot\frac{C}{2}$

$= \frac{2\cos\frac{A+B}{2}\sin\frac{A-B}{2}}{2\sin\frac{A+B}{2}\cos\frac{A-B}{2}}\cot\frac{C}{2}$

$=\cot(90-\frac{C}{2})\tan\frac{A-B}{2}\cot\frac{C}{2} = \tan\frac{A-B}{2}$

b. $P(n) = a^n-b^n \div (a-b)$

$P(1) = a-b$ $\quad P(1)$ is true

$P(k) = a^k-b^k \div (a-b) \Rightarrow P(k) = a^k-b^k = \lambda(a-b)$

$P(k+1) = a^{k+1}-b^{k+1} \div a-b$

$=(a-b)\lambda_1$, $\quad P(k+1)$ is true.

44 a. $(x^3+7)^{1/3} = x+\frac{7}{3}\times\frac{1}{x^2}-\frac{49}{9}\times\frac{1}{x^5}+\cdots$

$(x^3+4)^{1/3} = x+\frac{4}{3}\times\frac{1}{x^2}-\frac{16}{9}\times\frac{1}{x^5}+\cdots$

$\sqrt[3]{x^3+7}-\sqrt[3]{x^3+4} = \frac{1}{x^2}$

b. $\int\frac{2x+4}{x^2+4x+6}\,dx = \log|x^2+4x+6|+c$

M.A
45 a. $P(n) = 1^2+3^2+\cdots+(2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$

$P(1)$ is true $\quad P(k) = 1+3^2+\cdots+(2k-1)^2 = \frac{k(2k-1)(2k+1)}{3}$

$P(k)$ is true $\quad P(k+1) = \frac{(2k+1)(k+1)(2k+3)}{3}$

$P(k+1)$ is true.

b. RHS: $\begin{vmatrix} a & b & c\\ b & c & a\\ c & a & b\end{vmatrix} \times \begin{vmatrix} -a & -b & -c\\ c & a & b\\ b & c & a\end{vmatrix}$

$= \begin{vmatrix} 2bc-a^2 & c^2 & b^2\\ c^2 & 2ca-b^2 & a^2\\ b^2 & a^2 & 2ab-c^2\end{vmatrix}$ RHS

46 a. $a=9,\ h=-12,\ b=16,\ g=-16,\ f=8,\ c=-12$

$h^2-ab=0$

$144-144=0$

D.B.P.L $= 2\sqrt{\frac{g^2-ac}{a(a+b)}} = 2\sqrt{\frac{144}{9(25)}} = \frac{8}{5}$ units

b. $y\sqrt{1-x^2} = \sin^{-1}x$

$y\left(\frac{1}{2\sqrt{1-x^2}}(-2x)\right)+(\sqrt{1-x^2})y_1 = \frac{1}{\sqrt{1-x^2}}$

$-xy+(1-x^2)y_1 = 1$

$(1-x^2)y_2-3xy_1-y=0$

47 a. $u=5x-2 \qquad v=x^2+2x+2$

$u'=5 \qquad v'=2x+2$

$\frac{dy}{dx} = \frac{(x^2+2x+2)(5)-(5x-2)(2x+2)}{x^2+2x+2}$

$= \frac{-5x^2+4x+4}{x^2+2x+2}$

b. $AB = AE+EF+FB$

$AD = AE+EF+FD$

$CB = CE+EF+FB$

$CD = CE+EF+FD$

$AB+AD+CB+CD = 4EF+2(AE+CE)+2(FB+FD)$

$=4EF$

C. SELVAM, M.Sc., M.Ed.,
P.G. ASST. (MATHS),
ST. JOSEPH'S HR. SEC. SCHOOL,
CHENGALPATTU - 603002