STD: XI **FULL PORTION TEST**
Time Allowed: 3.00 Hrs. **MATHEMATICS** **Maximum Marks: 90**
PART-I

Note: i) Answer all the questions. **20 X 1 = 20**

1. If two sets A and B have 17 elements in common, then the number of elements common to the set $A\times B$ and $B\times A$ is
   a) 2^{17} b) 17^2 c) 34 d) insufficient data
2. The value of $\log_{\sqrt{2}}512$ is
   a) 16 b) 18 c) 9 d) 12
3. Let $f_k(x)=\frac{1}{k}\left[\sin^k x+\cos^k x\right]$ where $x\in R$ and $k\geq 1$. Then $f_4(x)-f_6(x)=$
   a) $\frac{1}{4}$ b) $\frac{1}{12}$ c) $\frac{1}{6}$ d) $\frac{1}{3}$
4. If 10 lines are drawn in a plane such that no two of them are parallel and no three are concurrent, then the total number of points of intersection are
   a) 45 b) 40 c) 10! d) 2^{10}
5. The n^{th} term of the sequence 1, 2 ,4, 7, 11, …. Is
   a) n^3+3n^2+2n b) n^3-3n^2+3n c) $\frac{n(n+1)(n+2)}{3}$ d) $\frac{n^2-n+2}{2}$
6. The equation of the line with slope 2 and the length of the perpendicular from the origin equal to $\sqrt{5}$ is
   a) $x+2y=\sqrt{5}$ b) $2x+y=\sqrt{5}$ c) $2x+y=5$ d) $x+2y-5=0$
7. If the point $(x,-2)$, $(5,2)$, $(8,8)$ are collinear, then x is equal to
   a) -3 b) $\frac{1}{3}$ c) 1 d) 3
8. A vector $\overrightarrow{op}$ makes 60^0 and 45^0 with the positive direction of the x and y axes respectively. Then the angle between $\overrightarrow{op}$ and the z-axis is
   a) 45^0 b) 60^0 c) 90^0 d) 30^0
9. $\lim_{x\to\frac{\pi}{4}}\frac{\sin\alpha-\cos\alpha}{\alpha-\frac{\pi}{4}}$ is
   a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) 1 d) 2
10. $\lim_{x\to 0}\frac{8^x-4^x-2^x+1^x}{x^2}$
    a) $2\log 2$ b) $2(log2)^2$ c) $\log 2$ d) $3\log 2$
11. If $g(x)=\left(x^2+2x+1\right)f(x)$ and $f(0)=5$ and $\lim_{x\to 0}\frac{f(x)-5}{x}=4$, then $g'(0)$ is
    a) 20 b) 14 c) 18 d) 12
12. If $y=mx+c$ and $f(0)=f'(0)=1$, then $f(2)$ is
    a) 1 b) 2 c) 3 d) -3

13. $\int \frac{\sec x}{\sqrt{\cos 2x}} dx$ is

a) $\tan^{-1}(\sin x)+c$ b) $2\sin^{-1}(\tan x)+c$ c) $\tan^{-1}(\cos x)+c$ d) $\sin^{-1}(\tan x)+c$

14. If 3 is the logarithm of 343, then the base is

a) 5 b) 7 c) 6 d) 9

15. If two events A and B are such that $P(\overline{A})=\frac{3}{10}$ then $P(A\cap \overline{B}) = \frac{1}{2}$, then $P(A\cap B)$ is

a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{1}{4}$ d) $\frac{1}{5}$

16. If A,B,C are three sets such that $A\cap B = A\cap C$ and $A\cup B = A\cup C$ then

a) $A=C$ b) $B=C$ c) $A\cap B=\phi$ d) $A=B$

17. The number of numbers lying between 100 and 500 that are divisible by 7 not by 21 is

a) 57 b) 19 c) 38 d) 26

18. If the roots of $(a^2+b^2)x^2-2(bc+ad)x+c^2+d^2=0$ are equal then

a) $\frac{a}{b}=\frac{c}{d}$ b) $\frac{a}{c}+\frac{b}{d}=0$ c) $\frac{a}{d}=\frac{b}{c}$ d) $a+b=c+d$

19. Let $A=\begin{pmatrix}1 & 0\\ \frac{1}{3} & 1\end{pmatrix}$ then A^{45} is

a) b) $\begin{pmatrix}1 & 0\\ 16 & 1\end{pmatrix}$ c) $\begin{pmatrix}1 & 0\\ 15 & 1\end{pmatrix}$ d) $\begin{pmatrix}1 & 0\\ 3^{45} & 1\end{pmatrix}$

20. The non-zero vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ are related by $\vec{a}=5\vec{b}$ and $\vec{c}=-3\vec{b}$, Then the angle between the vectors $\vec{a}$ and $\vec{c}$ is

a) π b) 0 c) $\frac{\pi}{4}$ d) $\frac{\pi}{2}$

PART – II

Note: Answer any seven questions. Question No. 30 is Compulsory **7 X 2 = 14**

21. If $n(\rho(A))=1024, n(A\cup B)=15$ and $n(\rho(B))=32$, then find $n(A\cap B)$.

22. Find a positive number smaller than $\frac{1}{2^{1000}}$. Justify.

23. Prove that $\cos\left(\frac{3\pi}{4}+x\right)-\cos\left(\frac{3\pi}{4}-x\right)=-\sqrt{2}\sin x$

24. Find $\sqrt[3]{65}$.

25. Using cofactors of elements of second row, evaluate $|A|$, where $A=\begin{bmatrix}5 & 3 & 8\\ 2 & 0 & 1\\ 1 & 2 & 3\end{bmatrix}$.

26. Show that the points whose position vectors are $2\hat{i}+3j-5k, 3\hat{i}+j-2k$ and $6\hat{i}-5j+7k$ are collinear.

27. Evaluate $\lim_{x\to 2^-}\lfloor x\rfloor$ and $\lim_{x\to 2^+}\lfloor x\rfloor$

28. Integrate $\sec(2-15x)\tan(2-15x)$ with respect to x.

29. A town has 2 fire engines operating independently. The probability that a fire engine is available when needed is 0.96. What is the probability that a fire engine is available when needed?

30. For two events A and B, if $P(A)=P(A/B)=\frac{1}{4}$ and $P(B/A)=\frac{1}{2}$, then show that A and B are independent.

PART - III

Note: Answer any seven questions. Question No. 40 is Compulsory **7 X 3 = 21**

31. Find the domain of $\frac{1}{1-2\sin x}$.

32. If the equation $x^2-ax+b=0$ and $x^2-ex+f=0$ have one root in common and if the second equation has equal roots, then prove that $ae=2(b+f)$.

33. If $a\cos\theta-b\sin\theta=c$, Show that $a\sin\theta+b\cos\theta=\pm\sqrt{a^2+b^2-c^2}$

34. If ${}^{(n+2)}P_4=42\times {}^{n}P_2$ find n

35. If p_1 and p_2 are the length of the perpendiculars from the origin to the straight lines $x\sec\theta+y\,cosec\,\theta=2a$ and $x\cos\theta-y\sin\theta=a\cos 2\theta$, then prove that $p_1^{\,2}+p_2^{\,2}=a^2$.

36. If $\vec{a}$ and $\vec{b}$ are vectors represented by two adjacent sides of a regular hexagon, then find the vectors represented by other sides.

37. Compute $\lim_{x\to 1}\frac{x^m-1}{x^n-1}$, m and n are integers.

38. Differentiate : $h(t)=\left(t-\frac{1}{t}\right)^{\frac{3}{2}}$

39. If $f'(x)=9x^2-6x$ and $f(0)=-3$, find $f(x)$.

40. Integrate $\int\frac{dx}{\cos x-\sin x}$.

PART - IV

Note: Answer all the questions. **7 X 5 = 35**

41. a) From the curve $y=|x|$, draw i) $y=|x-1|+1$ ii) $y=|x+1|-1$ iii) $y=|x+2|-3$ **(OR)**

b) Resolve into partial fractions: $\frac{x^2+x+1}{x^2-5x+6}$

42. a) Prove that $3^{2n+2}-8n-9$ is divisible by 8 for all n ≥ 1. **(OR)**

b) What will Rs.500 amounts to in 10 years after its deposit in a bank which pays annual interest rate of 10% compounded annually?

43. a) State and prove Napier's formula. **(OR)**

b) Prove that the medians of a triangle are concurrent.

44. **a)** A $150m$ long train is moving with constant velocity of 12.5m/s. Find i) the equation of the motion of the train, ii) time taken to cross a pole. iii) The time taken to cross the bridge of length 850m is? **(OR)**

b) Prove that $|A|=\begin{vmatrix}(q+r)^2 & p^2 & p^2\\ q^2 & (r+p)^2 & q^2\\ r^2 & r^2 & (p+q)^2\end{vmatrix}=2pqr(p+q+r)^3$.

45. a) Compute $\lim_{x\to 1}\frac{\sqrt[3]{7+x^3}-\sqrt{3+x^2}}{x-1}$. **(OR)**

b) If $f(x)=|x+100|+x^2$, test whether $f'(-100)$ exists.

46. a) If $y=\frac{\sin^{-1}x}{\sqrt{1-x^2}}$ show that $(1-x^2)y_2-3xy_1-y=0$. **(OR)**

b) If $x=\sum_{n=0}^{\infty}\cos^{2n}\theta$, $y=\sum_{n=0}^{\infty}\sin^{2n}\theta$ and $z=\sum_{n=0}^{\infty}\cos^{2n}\theta\sin^{2n}\theta$, $0<\theta<\frac{\pi}{2}$, then show that $xyz=x+y+z$

47. a) Integrate with respect to x: $\sqrt{(6-x)(x-4)}$. **(OR)**

b) An advertising executive is studying television viewing habits of married men and women during prime time hours. Based on the past viewing records he has determined that during prime time wives are watching television 60% of the time. It has also been determined that when the wife is watching television, 40% of the time the husband is also watching. When the wife is not watching the television, 30% of the time the husband is also watching the television. Find the probability that i) the husband is watching the television during the prime time of television ii) if the husband is watching the television, the wife is also watching the television.

B.SUGADEV. M.Sc., B.Ed. (MATHS)
8148406242

(FP – II)