INDIAN SCHOOL MUSCAT – SENIOR SECTION – DEPARTMENT OF MATHEMATICS
QUESTION BANK – MATHEMATICS(041) – CLASS 12– (2019 – 20)

S.NO	MCQ(1 Mark Each)
1	The maximum number of equivalence relations on the set A = {1, 2, 3} are (a) 1 (b) 2 (c) 3 (d)5
2	Let us define a relation R in R as aRb if a ≥ b. Then R is (a) an equivalence relation (b) symmetric, transitive but not reflexive (c) neither transitive nor reflexive but symmetric (d) reflexive, transitive but not symmetric
3	Let f : R → R be defined by f (x) = $\frac{1}{X}$ Then f is (a) one-one (b) onto (c) bijective (d) f is not defined
4	Let f: R → R be given by f (x) = tan x. Then f^{-1} (1) is (a)$\frac{\pi}{4}$ (b) $\left\{n\pi + \frac{\pi}{4}\ , n \in Z\right\}$ (c) does not exist (d) none of these
5	If f (x) = $x^3$and g(x) = cos 3x , then fog is (a) x^3cos 3x (b) cos $3x^3$(c) $\cos^3 3x$ (d) 3cos x^3.
6	The domain of the function y = $\sin^{-1}(-x^2)$ is (a) [0, 1] (b) (0, 1) (c) [–1, 1] (d) ϕ
7	If $\sin^{-1}x + \sin^{-1}y = \frac{\pi}{2}$, then value of $\cos^{-1}x + \cos^{-1}y$ is (a) $\frac{\pi}{2}$ (b) π(c) $\frac{2\pi}{3}$ (d) 0
8	The value of tan $(cos^{-1}\frac{3}{5} + tan^{-1}\frac{1}{4})$is (a) $\frac{8}{19}$ (b) $\frac{19}{12}$ (c) $\frac{3}{4}$ (d)$\frac{19}{8}$
9	The number of real solutions of the equation$\sqrt{1+cos2x} = \sqrt{2}\,cos^{-1}$(cosx) in $\left[\frac{\pi}{2},\ \pi\right]$ (a) 1 (b) 2 (c) Infinite (d) 0
10	The value of $\cos^{-1}(\cos\frac{3\pi}{2})$ is (a) $\frac{\pi}{2}$ (b)$\frac{5\pi}{2}$ (c)$\frac{3\pi}{2}$ (d)$\frac{7\pi}{2}$
11	If A is a square matrix such that A^2= A, then $(I + A)^2 - 3A$ is (a) I (b) 2A (c) 3I (d) A
12	The diagonal elements of a skew symmetric matrix are (a) all zeroes (b) are all equal to some scalar k(≠ 0) (c) can be any number (d) none of these
13	If A and B are symmetric matrices of the same order, then (AB′ –BA′) is a (a) Skew symmetric matrix (b) Null matrix (c) Symmetric matrix (d) None of these
14	If a matrix A is both symmetric and skew symmetric then matrix A is (a) a scalar matrix (b) a diagonal matrix (c) a zero matrix of order n × n (d) a rectangular matrix.
15	If $\begin{bmatrix}2x+y & 4x\\5x-7 & 4x\end{bmatrix} = \begin{bmatrix}7 & 7y-13\\y & x+6\end{bmatrix}$,then values of x and y are (a) x = 3, y = 1 (b) x = 2, y = 3 (c) x = 2, y = 4 (d) x = 3, y = 3
16	The area of a triangle with vertices (–3, 0), (3, 0) and (0, k) is 9 sq. units. The value of k will be (a) 9 (b) 3 (c) – 9 (d) 6
17	The value of the determinant $\begin{vmatrix}x & x+y & x+2y\\x+2y & x & x+y\\x+y & x+2y & x\end{vmatrix}$ is

	(a) $9x^2(x + y)$ (b) $9y^2(x + y)$ (c) $3y^2(x + y)$ (d) $7x^2(x + y)$
18	Let A be a square matrix of order 3 × 3 and k a scalar, then | kA | is equal to (a) k | A | (b) | k | | A | (c) k^3| A | (d) none of these
19	Let A be a non-singular square matrix of order 3 × 3, then |A. adj A| is equal to (a) $\|A\|^3$ (b) $\|A\|^2$(c) |A| (d) 3|A|
20	A function f is said to be continuous for x ∈R, if (a) it is continuous at x = 0 (b) differentiable at x = 0 (c) continuous at two points (d) differentiable for x ∈R
21	The value of c in Mean value theorem for the function f (x) = x (x – 2), x ∈[1, 2] is (a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d)$\frac{-3}{2}$
22	The set of points where the functions f given by f (x) = |x – 3| cosx is differentiable is (a) R (b) R – {3} (c) (0, ∞) (d) none of these
23	Differential coefficient of sec ($\tan^{-1}$x) w.r.t. x is (a) $\frac{x}{\sqrt{1+x^2}}$ (b)$\frac{x}{1+x^2}$ (c)$\frac{1}{\sqrt{1+x^2}}$ (d)$x\sqrt{1+x^2}$
24	If u = $sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and v =$tan^{-1}\left(\frac{2x}{1-x^2}\right)$,then $\frac{du}{dv}$ is (a) $\frac{1}{2}$ (b) 1 (c) x (d)$\frac{1-x^2}{1+x^2}$
25	The function f (x) = $e^{\|x\|}$ is (a) continuous everywhere but not differentiable at x = 0 (b) continuous and differentiable everywhere (c) not continuous at x = 0 (d) none of these.
26	The magnitude of the vector 6 $\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ is (a) 5 (b) 1 (c) 7 (d)12
27	The vector with initial point P (2, –3, 5) and terminal point Q(3, –4, 7) is (a) $\hat{\imath} - \hat{\jmath} + 2\hat{k}$ (b) $5\hat{\imath} - 7\hat{\jmath} + 12\hat{k}$ (c)$-\hat{\imath} + \hat{\jmath} - 2\hat{k}$ (d) None of these
28	The angle between the vectors$\hat{\imath} - \hat{\jmath}$ and $\hat{\jmath} - \hat{k}$ is (a) $\frac{\pi}{3}$ (b)$\frac{2\pi}{3}$ (c) $\frac{5\pi}{6}$ (d)$\frac{-\pi}{3}$
29	The area of the parallelogram whose adjacent sides are $\hat{\imath} + \hat{k}$ $and 2\hat{\imath} + \hat{\jmath} + \hat{k}$ is (a) $\sqrt{2}$ (b) 4 (c) $\sqrt{3}$ (d) 3
30	The projection of vector $\vec{a} = 2\hat{\imath} - \hat{\jmath} + \hat{k}$ along $\vec{b} = \hat{\imath} + 2\hat{\jmath} + 2\hat{k}$is (a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c)$\sqrt{6}$ (d) 2
31	The equation of the normal to the curve y = sin x at (0, 0) is: (a) x = 0 (d) y = 0 (c) x + y = 0 (d) x – y = 0
32	The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. The rate at which the area increases, when side 10 cm is: (a) 10 cm^2/s (b)$\sqrt{3}$ cm^2/s (c) 10 $\sqrt{3}$ cm^2/s (d) $\frac{10}{3}$$cm^2$/s
33	The slope of tangent to the curve x = t^2 + 3t – 8, y = $2t^2$ – 2t – 5 at the point (2, –1) is: (a) $\frac{22}{7}$ (b) -6 (c)$\frac{6}{7}$ (d)$\frac{-6}{7}$
34	y = x $(x – 3)^2$decreases for the values of x given by : (a) 1 < x < 3 (b) x < 0 (c) x > 0 (d) 0 < x <$\frac{3}{2}$
35	Which of the following functions is decreasing on (0,$\frac{\pi}{2}$)? (a) sin2x (b) tanx (c) cosx (d) cos 3x
36	$\int e^x(\cos x - \sin x)dx$ is equal to (a) e^xcos x + C (b) e^xsin x + C (c)-e^xcos x + C(d)-e^xsin x + C

37	$\int \frac{dx}{\sin^2 x \cos^2 x}$ is equal to (a) tan x + cot x + C(b) $(\tan x + \cot x)^2$+ C (c) tanx – cotx + C (d)$(\tan x - \cot x)^2$ + C
38	The value of $\int \frac{x^3}{1+x^8}$ dx is equal to (a) $\frac{1}{4}\tan^{-1}x^4 + C$ (b) $\frac{1}{2}\tan^{-1}x^4 + C$ (c) $\frac{1}{4}\cot^{-1}x^2 + C$ (d) None of these
39	$\int_{a+c}^{b+c} f(x)dx$ is equal to (a) $\int_a^b f(x)dx$ (b)$\int_a^b f(x-c)dx$ (c) $\int_a^b f(x+c)dx$ (d)$\int_{a-c}^{b-c} f(x)dx$
40	$\int_0^{\frac{\pi}{2}} \sqrt{1-sin2x}$ dx is equal to (a) 2 $\sqrt{2}$ (b) 2($\sqrt{2}$ +1) (c) 2 (d) 2($\sqrt{2}$ −1)
41	The order of the differential equation of all circles of given radius a is: (a) 1 (b) 4 (c) 3 (d)2
42	The solution of the differential equation 2x.$\frac{dy}{dx}$ – y = 3 represents a family of (a) straight lines (b) circles(c) parabolas (d) ellipses
43	The integrating factor of the differential equation$\frac{dy}{dx}$ (x log x) + y = 2 log x is (a) log x (b) log (log x) (c) e^x (d) x
44	Which of the following is not a homogeneous function of x and y. (a) x^2+ 2xy (b) sin x – cosy (c) 2x – y (d)$cos^2\left(\frac{y}{x}\right)+\frac{y}{x}$
45	Solution of the differential equation $\frac{dx}{x} + \frac{dy}{y}$ = 0 is (a) log x. log y = c (b) $\frac{1}{x} + \frac{1}{y}$= c(c) xy = c (d) x + y = c
46	The equations of x-axis in space are (a) x = 0, y = 0 (b) x = 0, z = 0 (c) x = 0 (d) y = 0, z = 0
47	The reflection of the point (α, β, γ) in the xy– plane is (a) $(\alpha, \beta, 0)$ (b) $(0, 0, \gamma)$ (c)$(-\alpha, -\beta, \gamma)$ (d)$(\alpha, \beta, -\gamma)$
48	The ratio in which yz-plane divides the line joining the points A(3, 1, -5) and B(1, 4, -6) is (a) -3 : 1 (b) 3 : 1 (c) -1 : 3 (d) 1 : 3
49	The equation of the plane parallel to the plane 4x - 3y + 2z + 1 = 0 and passing through the point (5, 1, - 6) is (a)4x – 3y + 2z – 5 = 0 (b) 3x – 4y + 2z – 5 = 0 (c)3x – 4y + 2z + 5 = 0(d)4x – 3y + 2z + 5 = 0
50	The angle between two lines whose direction cosines are given by the equation l + m + n = 0, $l^2 + m^2 + n^2$ =0 is (a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{4}$ (d)None of these
51	If P(A ∩B) = $\frac{7}{10}$ and P(B) = $\frac{17}{10}$,then P(A|B) equals (a) $\frac{14}{17}$ (b) $\frac{7}{8}$ (c) $\frac{17}{20}$ (d)$\frac{1}{8}$
52	Two events A and B will be independent, if (a) A and B are mutually exclusive (b) P(A’B’) = [1 – P(A)] [1 – P(B)] (c) P(A) = P(B)(d) P(A) + P(B) = 1
53	The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is

	(a) 1 (b) $\frac{8}{3}$ (c) 2 (d) 5
54	If A and B are any two events such that P(A) + P(B) – P(A and B) = P(A), then (a) $P(B \mid A) = 1$ (b) $P(A \mid B) = 1$ (c) $P(B \mid A) = 0$ (d) $P(A \mid B) = 0$
55	The probability that a student is not a swimmer is $\frac{1}{5}$. Then the probability that out of five students, four are swimmers is (a) $5C_4\left(\frac{4}{5}\right)^4\frac{1}{5}$ (b) $\left(\frac{4}{5}\right)^4\frac{1}{5}$ (c) $5C_1\left(\frac{4}{5}\right)^4\frac{1}{5}$ (d) None of these
	SA- SHORT ANSWER TYPE QUESTIONS (2 Marks Each)
56	Show that the function $f: R \rightarrow R$ given by $f(x) = x^3$ is injective.
57	Show that the relation R in the set Z of integers given by R = {(*a, b*) : 2 divides *a – b*} is an equivalence relation.
58	Show that if $f: A \rightarrow B$ and $g: B \rightarrow C$ are one-one, then $gof: A \rightarrow C$ is also one-one.
59	If f(x) = x + 7 and g(x) = x – 7, x∈R, find (fog) (7)
60	If $f(x)$ is an invertible function, find the inverse of $f(x)=\frac{3x-2}{5}$
61	What is the range of the function $f(x) = \frac{\lvert x-1 \rvert}{x-1}$?
62	Let f: R →R be defined as $f(x)$ =10x +7. Find the function g: R →R such that gof = fog =IR.
63	Prove that : $3\sin^{-1}x = \sin^{-1}(3x - 4x^3)$, $x \in \left(\frac{-1}{2}, \frac{1}{2}\right)$
64	Prove that : $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$
65	Simplify : $\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right)$,$0 < x < \pi$
66	Solve for x : $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$
67	Find the principal value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$
68	Write the value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$
69	If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1}x\right) = 1$, then find the value of 'x'
70	If $\tan^{-1}x + \tan^{-1}y = \frac{\pi}{4}$,then write the value of x + y + xy
71	Find X and Y ,if X + Y = $\begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and X – Y = $\begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$
72	Find the values of *x* and *y* from the following equation: $2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$
73	If F(x) = $\begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$,show that F(x).F(y) = F(x + y)
74	If A = $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ and A +A' = I, then find the value of α.
75	If *A* and *B* are symmetric matrices, prove that *AB – BA* is a skew-symmetric matrix.
75	For what values of x, $\begin{bmatrix} 1 & 2 & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix}\begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix} = 0$?
76	If A is a square matrix such that $A^2 = A$, then write the value of $7A - (I + A)^3$, where I is an identity matrix.
77	For what value of *x*, is the matrix A = $\begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ a skew-symmetric matrix?
78	If matrix A = $\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = KA$, then write the value of 'k'.

79	If area of triangle is 35 sq. units with vertices (2, – 6), (5, 4) and (k, 4). Then find the valueof k.
80	Let A be a square matrix of order 3 × 3. Write the value of $\|2A\|$, where $\|A\|$= 4.
81	Write the value of the following determinant: $\begin{vmatrix} 102 & 18 & 36 \\ 1 & 3 & 4 \\ 17 & 3 & 6 \end{vmatrix}$
83	Evaluate: $\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$
84	If $\begin{vmatrix} x+2 & 3 \\ x+5 & 4 \end{vmatrix}$ = 3, find the value of 'x'.
85	Evaluate : $\begin{vmatrix} cos15° & sin15° \\ sin75° & cos75° \end{vmatrix}$
86	Write the value of the determinant $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$
87	Prove that the function f given by $f(x) = \| x – 1 \|$, $x \in R$ is not differentiable at x = 1.
88	Find $\frac{dy}{dx}$,if y = $sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$,$0< x < 1$
89	Differentiate sin ($\tan^{-1}e^{-x}$) with respect to x.
90	Differentiate log (cos e^x) with respect to x.
91	Differentiate cos (log $x + e^x$), $x > 0$ with respect to x.
92	Find $\frac{dy}{dx}$ if x= cos θ – cos 2θ, y = sin θ – sin 2θ
93	Find the position vector of a point R which divides the line joining two points P and Q whose position vectors are $\hat{\imath} + 2\hat{\jmath} - \hat{k}$ and - $\hat{\imath} + \hat{\jmath} + \hat{k}$respectively, in the ratio 2 : 1 (i) internally (ii) externally
94	If $\vec{a} = 5\hat{\imath} - \hat{\jmath} - 3\hat{k}$ and $\vec{b} = \hat{\imath} + 3\hat{\jmath} - 5\hat{k}$,then show that the vectors $\vec{a} + \vec{b}$and $\vec{a} - \vec{b}$ are perpendicular
95	Show that the pointsA ($-2\hat{\imath} + 3\hat{\jmath} + 5\hat{k}$), B ($\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$), C ($7\hat{\imath} - \hat{k}$) are collinear.
96	Find the area of a triangle having the points A (1, 1, 1), B (1, 2, 3) and C (2, 3, 1) as its vertices.
97	If a is $\vec{a}$ unit vector $(\vec{x} - \vec{a})(\vec{x} + \vec{a})$ = 24 ,then write the value of $\|\vec{x}\|$
98	A die is thrown twice and the sum of the numbers appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once?
99	The probabilities of two students A and B coming to the school in time are $\frac{3}{7}$and $\frac{5}{7}$respectively. Assuming that the events, 'A coming in time' and 'B coming in time' areindependent, find the probability of only one of them coming to the school in time.
100	A speaks truth in 60% of the cases, while B in 90% of the cases. Find the probability that they likely to contradict each other in stating the same fact?
101	Find the mean number of heads in three tosses of a fair coin.
102	Find : $\int \sqrt{3-2x-x^2}$ dx
103	Find : $\int \frac{sin^3\ x + cos^3\ x}{sin^2 x\ cos^2 x}$ dx
104	Find : $\int \frac{x-3}{(x-1)^3} e^x$ dx
105	Find the differential equation of the family of curves y = Ae^{2x} + Be^{-2x} ,where A and B are arbitrary constants.
106	Find the differential equation representing the family of curves y^2 = m $(a^2 - x^2)$ by eliminating the

	arbitrary constants 'm' and 'a'.
107	Find : $\int \frac{\sin x - \cos x}{\sqrt{1+\sin 2x}}$ dx ,0$< x < \frac{\pi}{2}$
108	Find : $\int \frac{\sin(x-a)}{\sin(x+a)}$dx
109	Find : $\int (log x)^2$dx
110	Show that the vectors $\hat{i} - 2\hat{j} + 3\hat{k}$,$-2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\hat{i} - 3\hat{j} + 5\hat{k}$ are coplanar.
111	Mother, father and son line up at random for a family photo. If A and B are two events given by A = son on one end ,B = Father in the middle ,find P(B/A)
112	Let X be a random variable which assumes values x_1,x_2,x_3,x_4 such that 2P(X=x_1)=3P(X x_2)=P(X=x_3)=5P(X=x_4).Find the probability distribution of X.
113	A coin is tossed 5 times .Find the probability of getting (i) at least 4 heads (ii) at most 4 heads
	LA-I LONG ANSWER TYPE QUESTIONS (4 Marks Each)
114	Let T be the set of all triangles in a plane with R a relation in T given by R = {(T_1, T_2): T_1 is congruent to T_2}.Show that R is an equivalence relation.
115	Check whether the relation R defined in the set {1, 2, 3, 4, 5, 6} as R = {(a, b): b = a+1} is reflexive, symmetric or transitive.
116	Let L be the set of all lines in XY plane and R be the relation in L defined as R = {(L_1, L2): $L_1 \| L_2$}.Show that R is an equivalence relation. Find the set of all lines related to the line y=2x+4.
117	Consider *f:R*→ *R* given by *f* (*x*) = 4*x* + 3. Show that *f* is invertible. Find the inverse of *f.*
118	Find the value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(\frac{-1}{2}\right)$
119	Write the simplest form of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$
120	If sin($sin^{-1}\frac{1}{5} + cos^{-1}x$) = 1 ,find x.
121	Prove that $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\frac{1}{3} = \frac{9}{4}\sin^{-1}\frac{2\sqrt{3}}{3}$
122	If A = $\begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, I = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then find K such that A^2 = KA – 2I
123	Find the values of x, y, z if the matrix A = $\begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ satisfy the equation A'A =I_3
124	If A is a square matrix such that A^2= A, then find $(I + A)^3$– 7A
125	If A = $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$,prove that A^n = $\begin{bmatrix} 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \end{bmatrix}$
126	

	If A = $\begin{bmatrix} 8 & 0 \\ 4 & -2 \\ 3 & 6 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & -2 \\ 4 & 2 \\ -5 & 1 \end{bmatrix}$, then find the matrix X such that 2A + 3X = 5B.
127	Using properties of determinants, prove that $\begin{vmatrix} a+x & y & z \\ x & a+y & z \\ x & y & a+z \end{vmatrix}$ =a^2 (a + x+ y+ z)
128	Using properties of determinants, prove the following: $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix}$ = $9b^2$ (a+b)
129	Using properties of determinants, prove the following: $\begin{vmatrix} x & x^2 & yz \\ y & y^2 & zx \\ z & z^2 & xy \end{vmatrix}$ = (x-y)(y-z)(z-x)(xy +yz +zx)
130	If a, b, c is in A.P, and then find the value of $\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$
140	If x= $\sqrt{a^{sin^{-1}t}}$,y = $\sqrt{a^{cos^{-1}t}}$,show that $\frac{dy}{dx}$ = $\frac{-y}{x}$
141	Differentiate$sin^{-1}\left[\frac{2^{x+1}}{1+4^x}\right]$w.r.t. to x.
142	If y = 3 cos (log x) + 4 sin (log x). Show that x^2y_2+ xy_1+ y = 0
143	If x = a (cos t + t sin t) and y = a (sin t – t cos t), find$\frac{d^2y}{dx^2}$
144	If y = $\sqrt{cos\ x + \sqrt{cos\ x + \sqrt{cos\ x + \cdots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots}}}$, prove that (1-2y)$\frac{dy}{dx}$ = sin x
145	Discuss the continuity of the following function at x = 0 f(x) = $\begin{cases} \frac{x^4+2x^3+x^2}{tan^{-1}x} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$
146	Show that the function *f* defined as follows, is continuous at *x* = 2, but not differentiable: f(x) = $\begin{cases} 3x-2, & 0 < x \le 1 \\ 2x^2 - x, & 1 < x \le 2 \\ 5x-4, & x > 2 \end{cases}$
147	

	Evaluate : $\int \frac{e^{sin^{-1}x}}{\sqrt{1-x^2}}$ dx
148	Evaluate :$\int \frac{1}{x\sqrt{x^6-1}}$ dx
149	Evaluate :$\int \frac{\sqrt{\tan x}}{\sin x.\cos x}$ dx
150	Evaluate : $\int \frac{6x+7}{\sqrt{(x-5)(x-4)}}$dx
151	Evaluate : $\int_0^{\frac{\pi}{4}} \frac{\sin x+\cos x}{9+16 \sin 2x}$ dx
152	Evaluate : $\int_1^4 [\lvert x-1\rvert + \lvert x-2\rvert + \lvert x-3\rvert]$dx
153	Evaluate : $\int_0^{\frac{\pi}{2}} (2 \log \sin x - \log \sin 2x)$dx
154	Draw the graph of the curve $y = \sqrt{9-x^2}$ and find the area bounded by this curve and the coordinate axis.
155	Find the area of the smaller part of the circle $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$
156	Find the area enclosed between the curve $y = x^3$ and the line y = x.
157	Find the area of the circle $4x^2 + 4y^2 = 9$ which is interior to the parabola $y^2 = 4x$.
158	Using integration, find the area of region bounded by the triangle whose vertices are (-1, 0), (1, 3) and (3, 2).
159	Find the area enclosed by the parabola $4y = 3x^2$ and the line 2y = 3x + 12.
160	Find the general solution. of the differential equation $\frac{dy}{dx} - y = \cos x$
161	Find the particulars solution of differential equation $(1 + x^2)$ dy +2xy dx = cot x dx
162	Solve the differential equation $(x^3 + x^2 + x + 1)\frac{dy}{dx} = 2x^2 + x$, x= 0 ,y= 1
163	Solve $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right) dy = 0$

164	Solve the differential equation: $ye^{\frac{x}{y}}dx = \left(x\,e^{\frac{x}{y}} + y^2\right)dy$.
165	Find the shortest distance between the lines $\vec{r} = (\hat{\imath} + 2\hat{\jmath} + \hat{k}) + \alpha(\hat{\imath} - \hat{\jmath} + \hat{k})$ $\vec{r} = (2\hat{\imath} - \hat{\jmath} - \hat{k}) + \beta(2\hat{\imath} + \hat{\jmath} + 2\hat{k})$
166	Find the angle between the two planes 3x – 6y + 2z = 7 and 2x + 2y - 2z = 5
167	Find the vector and Cartesian equation of the line through the point (5, 2,-4) and which is parallel to the vector $3\hat{\imath} + 2\hat{\jmath} - 8\hat{k}$
168	Find the vector equations of the plane passing through the points R(2,5,-3),Q(-2,-3,5) and T (5,3,-3).
169	Show that the lines $\frac{x-5}{7} = \frac{y+2}{-5} = \frac{z}{1}$ and $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ are perpendicular to each other
170	Find the equation of the plane through the intersection of the planes 3x – y + 2z -4 = 0 and x + y + z – 2 = 0 and the point (2,2,1)
	LA –II LONG ANSWER TYPE QUESTIONS (6 Marks Each)
171	Two tailors A and B earn Rs 150 and Rs 200 per day respectively. A can stitch 6shirts and 4 pants per day while B can stich 10 shirts and 4 Pants per day. How manydays each work if it is desired to produce at least 60 shirts and 32 pants at a minimum labour cast?
172	A farmer mixes two brands P and Q of cattle feed. Brand P, costing Rs 250 per bag,contains 3 units of nutritional elements A, 2.5 units of element B and 2 units of elementC. Brand Q costing Rs 200 per bag contains 1.5 units of nutritional element A, 11.25 units of element B and 3 units of element C. The minimum requirements of nutrients A, B andC are 18 units, 45 units and 24 units respectively. Determine the number of bags of each brand which should be mixed in order to produce a mixture having a minimum cost perbag? What is the minimum cost of the mixture per bag?
173	Anil wants to invest at most Rs 12,000 in bonds A and B. According to the rules hehas to invest at least Rs 2000 in bond A and at least Rs 4000 in bond B. If the rate of interest on bond A is 8% per annum and on bond B, it is 10% per annum, how should he invest the money for maximum interest.
174	A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5760 to invest and has space for at most 20 items. A fan costs him Rs. 360 and a sewing machine Rs. 240. His expectation is that he can sell a fan at a profit of Rs. 22 and a sewing machine at a profit of Rs. 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize the profit? Formulate this as a linear programming problem and solve it graphically.
175	A tank with rectangular base and rectangular sides, open at the top is to be constructed so that its depth is 2 m and volume is 8 m^3 .If the building of tank costs Rs.70 per square metre for the base and Rs.45 per square metre for the sides, what is the cost of least expensive tank?
176	If A = $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 0 & 2 \\ 3 & 1 & 1 \end{vmatrix}$.Find A^{-1},hence solve the system of equations x +y + z =6 ,x + 2z =7 ,3x + y + z =12
177	Find the inverse of the following matrix using elementary operations A = $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$
178	Using integration ,find the area of Δ ABC ,whose vertices are A(2,5) ,B(4,7) and C(6,2)
179	Find the area of the region lying above x – axis and included between the circle $x^2 + y^2 = 8x$ and inside of the parabola $y^2 = 4x$.
180	Find the vector and Cartesian equations of the plane passing through the points (2,2-1),(3,4,2) and

	(7,0,6).Also find the vector equation of a plane passing through (4,3,1) and parallel to the plane obtained above.
181	Find the vector equation of the plane that contains the line $\vec{r}$ = $(\hat{\imath} + \hat{\jmath})$ + λ $(\hat{\imath} + 2\hat{\jmath} - \hat{k})$ and the point (-1, 3,-4).Also find the length of the perpendicular drawn from the point (2, 1, 4) to the plane thus obtained.
182	Using integration, find the area of the region in the first quadrant enclosed by the x- axis, the line y = x and the circle $x^2 + y^2 = 32$
183	Evaluate $\int_1^3 (x^2 + 3x + e^x)$dx, as the limit of the sum.
184	Find the distance of the point (-1,-5,-10) from the point of intersection of the line $\vec{r}$ = $(2\hat{\imath} - \hat{\jmath} + 2\hat{k})$ +$\lambda(3\hat{\imath} + 4\hat{\jmath} + 2\hat{k})$ and the plane $\vec{r}$.$(\hat{\imath} - \hat{\jmath} + \hat{k})$ = 5
185	Show that the function f: R→R defined by f(x) = $\frac{x}{x^2+1}$,for all x∈R is neither one-one nor onto. Also, if g: R→R is defined as g(x) = 2x -1, find fog(x).
186	Using integration, find the area of the region $[(x, y): x^2 + y^2 \leq 16a^2 \text{ and } y^2 \leq 6ax]$
187	Using integration, find the area of triangle ABC bounded by the lines 4x-y+5=0,x+y-5 =0 and x-4y+5 =0
188	Find the vector equation of the line passing through (2,1,-1) and parallel to the line $\vec{r}$ = $(\hat{\imath} + \hat{\jmath})$ + λ $(2\hat{\imath} - \hat{\jmath} + \hat{k})$.Also find the distance between the two lines.
189	Find the coordinates of the foot Q of the perpendicular drawn from the point P(1,3,4) to the plane 2x – y + z + 3 = 0.Find the distance PQ and the image of P treating the plane as a mirror.
190	An isosceles triangle of vertical angle 2θ is inscribed in a circle of radius a.Show that the area of the triangle is maximum when $\theta = \frac{\pi}{6}$
191	Using matrices, solve the following system of linear equations : 2x + 3y + 10z =4 4x – 6y + 5z = 1 6x + 9y – 20z =2
192	In answering a question on a multiple choice questions test with four choices in each question, out of which only one is correct, a student either guesses or copies or knows the answer. The probability that he makes a guess is $\frac{1}{4}$ and the probability that he copies is also $\frac{1}{4}$.The probability that the answer is correct, given that he copied it is $\frac{3}{4}$.Find the probability that he knows the answer to the question, given that he correctly answered it.
193	A bag contains 5 red and 3 black balls and another bag contains 2 red and 6 black balls. Two balls are drawn at random (without replacement) from one of the bags and both are found to be red.Find the probability that balls are drawn from the first bag.
194	There are 3 coins .One is a coin having tails on both faces, another is biased coin that comes up tails70% of the time and the third is an unbiased coin. One of the coins is chosen at random and tossed, it shows tail. Find the probability that it was a coin with tail on both the faces.
195	There are 2 boxes I and II .Box I contains 3 red and 6 black balls. Box II contains 5 red and 'n' black balls. One of the two boxes, box I and box II is selected at random and a ball is drawn at random. The ball drawn is found to be red.If the probability that this red ball comes out from box II is $\frac{3}{5}$, find the value of 'n'.
196	In a hostel 60% of the students read Hindi newspaper, 40% read English newspaper and 20% read both Hindi and English newspapers. A student is selected at random. (a) Find the probability that she read neither Hindi nor English newspapers. (b) If the reads Hindi newspaper, find the probability that she reads English newspaper. (c) If she reads English newspapers, find the probability that she reads Hindi newspaper.
197	A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will

	come by train, bus, and scooter or by other mean of transport are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10}$ and $\frac{2}{5}$. The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}$ *and* $\frac{1}{12}$ if he comes by train, bus and scooter respectively, but he comes by other means of transport that he will not the late. When he arrives he is late. What is the probability that he comes by train.
198	Given three identical boxes I, II and III each containing two coins. In box-I both coins are gold coins, in box-II, both are silver coins and in the box-III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also ofgold.
199	From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs.
200	Bag I contain 3 red and 4 black balls and bag II contain 4 red and 5 black balls. One ball is transferred from Bag I to Bag II and then a ball is drawn from Bag II. The balls o drawn is found to be red in colour. Find the probability that the transferee ball is black.