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PG-EE–2013

Five Year Mathematics (Hons.)

Code **D**

Time : 1¼ hours **Max. Marks : 100** **Total Questions : 100**

Roll No.______________(in figure)________________________________ (in words)

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Question No.	Questions
1.	Choose the correct answer : $\int \frac{20\,x^{19} + 20^x \log_e 20}{x^{20} + 20^x}\,dx$ equals (1) $x^{20} + 20^x + c$ (2) $\log\left(\frac{1}{x^{20} + 20^x}\right) + c$ (3) $\log\left(20\,x^{19} + 20^x \log_e 20\right) + c$ (4) $\log\left(x^{20} + 20^x\right) + c$
2.	The value of $\sqrt{2}\int \frac{\sin x}{\sin\left(x - \frac{\pi}{4}\right)}\,dx$ is (1) $x + \log\left\|\cos\left(x - \frac{\pi}{4}\right)\right\| + c$ (2) $x - \log\left\|\sin\left(x - \frac{\pi}{4}\right)\right\| + c$ (3) $x + \log\left\|\sin\left(x - \frac{\pi}{4}\right)\right\| + c$ (4) $x - \log\left\|\cos\left(x - \frac{\pi}{4}\right)\right\| + c$
3.	The function $f(x) = \int \frac{x - 2}{x^2 - 7x + 12}\,dx$ (1) decreases on R (2) increases on R – (2, 3) (3) increases on $(2, 3) \cup (4, \infty)$ (4) $(2, \infty)$

Question No.	Questions
4.	$f(x) = \int \frac{dx}{\sin^4 x}$ is a (1) polynomial of degree 3 in cot x (2) polynomial of degree 4 in cot x (3) polynomial of degree 4 in cosec x (4) polynomial of degree 3 in cosec x
5.	The value of the integral $\int_{-1/2}^{1/2} \left([x] + \log \frac{1+x}{1-x}\right) dx$, where [x] is the greatest integral function of x, is (1) $\frac{1}{2}$ (2) 0 (3) $-\frac{1}{2}$ (4) $2 \log \frac{1}{2}$
6.	The value of $\int_0^1 \cot^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx$ is (1) 1 (2) 0 (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$
7.	Suppose that the graph of y = f (x) contains the points (0, 4) and (2, 7). If f' is continuous, then $\int_0^2 f'(x)\, dx$ is equal to (1) 11 (2) 7 (3) 4 (4) 3
8.	The area of the region bounded by the curves $y = \lvert x-2 \rvert$, x = 1, x = 3 and the x-axis is (1) 4 (2) 3 (3) 2 (4) 1

Question No.	Questions
9.	Area lying in the first quadrant bounded by the circle $x^2 + y^2 = 4$ and the lines $x = 0$ and $x = 2$ is (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$
10.	Let $f(x) = \int_1^x e^{-t^2/2}(1-t^2)\,dt$, then f has (1) maximum at $x = 0$ (2) maximum at $x = -1$ (3) maximum at $x = -1$ (4) no critical point
11.	A, B are symmetric matrices of same order, then BA – AB is a (1) symmetric matrix (2) skew-symmetric matrix (3) zero matrix (4) Identity matrix
12.	Let $A^2 - A + 1 = 0$ and $\lvert A \rvert \neq 0$, the inverse of A is (1) $I - A$ (2) $A - I$ (3) $A + I$ (4) A
13.	If A and B are two matrices such that AB = B and BA = A, then $A^2 - B^2$ is equal to (1) 0 (2) A + B (3) A – B (4) AB
14.	Let A be a square matrix of order 3 × 3, then $\lvert 5A \rvert$ is equal to (1) $5\lvert A \rvert$ (2) $25\lvert A \rvert$ (3) $125\lvert A \rvert$ (4) $15\lvert A \rvert$

Question No.	Questions
15.	Let A be a non-singular square matrix of order 3×3 and $\lvert A \rvert = 3$. Then $\lvert \mathrm{adj}\, A \rvert$ is equal to (1) 3 (2) 9 (3) 27 (4) 81
16.	If A is an invertible matrix of order 3 and det (A) = 3, then det $\left(A^{-1}\right)$ is equal to (1) $\frac{1}{3}$ (2) 3 (3) 9 (4) 0
17.	The value of k for which the system of equations $x + k\,y - 3\,z = 0$ $3\,x + k\,y - 2\,z = 0$ $2\,x + 3\,y - 4\,z = 0$ has a non-trival solution is (1) $\frac{21}{10}$ (2) 2 (3) $\frac{31}{10}$ (4) 4
18.	Minor of an element of a determinant of order 4 is a determinant of order (1) 4 (2) 3 (3) 2 (4) 1
19.	Let A and B are square matrices of the same order with $\lvert A \rvert = 3$ and $\lvert B \rvert = -5$, then $\lvert AB \rvert$ is (1) $\frac{5}{3}$ (2) 15 (3) -15 (4) None of these

Question No.	Questions
20.	Matrix equation of a system of linear equations is $AX = B$ and A is a singular matrix, then the system of equations is called inconsistent if (1) (adj A) $B = 0$ (2) Adj $A = 0$ (3) $B = 0$ (4) (adj A) $B \neq 0$
21.	Let the generator of a double-napped right circular cone be inclined to its vertical axis at an angle α. A plane cuts the nappe (other than the vertex) of the cone making an angle β with the vertical axis of the cone. The section so obtained on this intersection is parabola if (1) $\beta = 90°$ (2) $\alpha < \beta < 90°$ (3) $\beta = \alpha$ (4) $0 \leq \beta < \alpha$
22.	In an ellipse, the distance between the foci is 6 and minor axis is 8, then the eccentricity is (1) $\frac{3}{4}$ (2) $\frac{3}{5}$ (3) $\frac{4}{5}$ (4) $\frac{2}{3}$
23.	Length of latus rectum of the hyperbola $\frac{y^2}{9} - \frac{x^2}{27} = 1$ is (1) 18 (2) $2\sqrt{3}$ (3) 6 (4) $\frac{2}{3}$
24.	Ratio in which the line segment joining the points (4, 8, 10) and (6, 10, – 8) is divided by the xz-plane is (1) 2 : 3 externally (2) 2 : 3 internally (3) 4 : 5 externally (4) 5 : 4 internally

Question No.	Questions
25.	If the origin is the centroid of a triangle PQR and the co-ordinates of its two vertices P and Q are (– 4, 2, 6) and (– 4, – 16, – 10) respectively, then the co-ordinates of the vertex R are (1) $\left(-\frac{8}{3}, -\frac{14}{3}, -\frac{4}{3}\right)$ (2) (– 8, – 14, – 4) (3) $\left(\frac{8}{3}, \frac{14}{3}, \frac{4}{3}\right)$ (4) (8, 14, 4)
26.	$\lim_{x \to 0} \frac{\sqrt{1-\cos 2x}}{\sqrt{2}x}$ (1) exists and it equals to 1 (2) exists and it equals to – 1 (3) exists and it equals to 0 (4) does not exist
27.	If $\lim_{x \to 0} \frac{\sin px}{\tan 3x} = 4$, then the value of p is (1) $\frac{3}{4}$ (2) $\frac{4}{3}$ (3) 12 (4) 4
28.	The derivative of an even function is always (1) an odd function (2) an even function (3) does not exist (4) None of these

Question No.	Questions
29.	If $f'(3) = 2$, then $\lim\limits_{h \to 0} \dfrac{f(3+h^2) - f(3-h^2)}{2h^2}$ is (1) 1 (2) 2 (3) 0 (4) $\frac{1}{2}$
30.	Which of the following sentences is not a statement ? (1) There are 35 days in a month (2) The sum of 5 and 7 is greater than 10 (3) Mathematics is difficult (4) All real numbers are complex numbers
31.	For any real numbers x and y, cos x = cos y implies (1) $x = n\pi + (-1)^n y$, where $n \in Z$ (2) $x = n\pi \pm y$, where $n \in Z$ (3) $x = n\pi + y$, where $n \in Z$ (4) $x = (2n+1)\frac{\pi}{2} + y$, where $n \in Z$
32.	If the roots of the quadratic equation $x^2 + px + q = 0$ are tan 30° and tan 15°, then the value of $2 + q - p$ is (1) 0 (2) 1 (3) 2 (4) 3
33.	If $\cos^{-1} x + \cos^{-1} y = \frac{2\pi}{2}$, then $\sin^{-1} x + \sin^{-1} y$ is equal to (1) $\frac{2\pi}{3}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) π

Question No.	Questions
34.	Principal value of $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ is (1) $\frac{2\pi}{3}$ (2) $\frac{\pi}{3}$ (3) $-\frac{2\pi}{3}$ (4) $-\frac{\pi}{3}$
35.	$\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\frac{x-y}{x+y}$ is equal to (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $-\frac{3\pi}{4}$
36.	$3\cos^{-1}x - \pi x - \frac{\pi}{2} = 0$ has (1) one solution (2) one and only one solution (3) no solution (4) more than one solution
37.	A set S is said to be an inductive set if (1) $x+1 \in S$ implies $x \in S$ and $1 \notin S$ (2) $x+1 \in S$ implies $x \in S$ and $1 \in S$ (3) $x \in S$ implies $1 \in S$ (4) $1 \in S$ and $x+1 \in S$ whenever $x \in S$
38.	If $\left(\frac{1+i}{1-i}\right)^x = 1$ and n is any positive integer then (1) $x = 2n$ (2) $x = 4n+1$ (3) $3 = 2n+1$ (4) $x = 4n$

Question No.	Questions
39.	The argument of complex number $\frac{1}{1+i}$ is (1) $\frac{\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) $-\frac{\pi}{2}$
40.	A linear inequality in two variables is known as (1) boundary of the half plane (2) line (3) half plane (4) feasible region
41.	If $\vec{r} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$, the equation of the plane through (3, 4, – 1) which is parallel to the plane $2x - 3y + 5z + 7 = 0$ is (1) $\vec{r}\cdot\left(2\,\hat{i} - 3\,\hat{j} + 5\,\hat{k}\right) + 11 = 0$ (2) $\vec{r}\cdot\left(3\,\hat{i} + 4\,\hat{j} - \hat{k}\right) + 11 = 0$ (3) $\vec{r}\cdot\left(3\,\hat{i} - 4\,\hat{j} - \hat{k}\right) + 7 = 0$ (4) $\vec{r}\cdot\left(2\,\hat{i} - 3\,\hat{j} + 5\,\hat{k}\right) - 7 = 0$
42.	The constants in a linear programming problem are (1) linear (2) quadratic (3) cubic (4) biquadratic

Question No.	Questions
43.	The common region determined by all the constants including non-negative constraints of a linear programming problem is called the (1) optimal solution (2) feasible solution (3) infeasible solution (4) unbounded solution
44.	The corner points of the feasible region determined by the following system of linear inequalities : $2x + y \le 10$, $x + 3y \le 15$; $x, y \ge 0$ are (0, 0), (5, 0), (3, 4) and (0, 5). Let $Z = px + qy$, where $p, q > 0$. Condition on p and q so that the maximum of Z occurs at both (3, 4) and (0, 5) is (1) $p = q$ (2) $p = 2q$ (3) $q = 3p$ (4) $p = 3q$
45.	If A and B be two events such that $P(A) = 0.4$, $P(A \cup B) = 0.8$. If A and B are independent events, then the probability $P(B)$ is (1) $\frac{2}{5}$ (2) $\frac{3}{5}$ (3) $\frac{1}{5}$ (4) $\frac{2}{3}$
46.	If A and B are two events such that $0 < P(B) < 1$, then (1) $P(A\|\overline{B}) + P(\overline{A}\|\overline{B}) = 1$ (2) $P(A\|B) + P(A\|\overline{B}) = 1$ (3) $P(\overline{A}\|B) + P(A\|\overline{B}) = 1$ (4) None of these

Question No.	Questions
47.	If the standard deviation of the binomial distribution $(q + p)^{16}$ is 2, then mean of the distribution is (1) 6 (2) 8 (3) 10 (4) 12
48.	A fair coin is tossed repeatedly. If head and tail appear alternatively on first 5 tosses, then the probability that head appears on the sixth toss is (1) $\frac{1}{2}$ (2) $\frac{1}{32}$ (3) $\frac{1}{64}$ (4) $\frac{5}{64}$
49.	A and B toss a coin alternatively till one of them gets a head and wins the game. If A begins the game, the probability that B wins the game is (1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) $\frac{2}{3}$
50.	Posteriori probability for an event is obtained using (1) Additive law of probability (2) Multiplication theorem of probability (3) Bayes' theorem (4) Classical definition of probability
51.	Let h (x) = min $\{x, x^2\}$ for every real number x. Then (1) h is continuous for all x (2) h is differentiable for all x (3) $h'(x) = 0$ for all $x > 1$ (4) h is differentiable at two values of x, that is, 0 and 1

Question No.	Questions
52.	Let a function f be defined by $f(x) = \frac{x - \lvert x \rvert}{x}$ for $x \neq 0$ and $f(0) = 2$. Then f is (1) continuous nowhere (2) continuous everywhere (3) continuous for all x except at $x = 1$ (4) continuous for all x except at $x = 0$
53.	$\frac{d}{dx}\left[\tan^{-1}(\sec x + \tan x)\right]$ is equal to (1) 0 (2) $\sec x - \tan x$ (3) $\frac{1}{2}$ (4) 2
54.	If $x = \log t$ and $y = t^2 - 1$, then $\frac{d^2y}{dx^2}$ at $t = 2$ is (1) 8 (2) 16 (3) 4 (4) 2
55.	If $y = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $0 < x < 1$; then $\frac{dy}{dx}$ is equal to (1) $\frac{2}{\sqrt{1-x^2}}$ (2) $\frac{-2}{\sqrt{1-x^2}}$ (3) $\frac{2}{1+x^2}$ (4) $\frac{-2}{1+x^2}$

Question No.	Questions
56.	Let A and B be two points on the graph of function $y = f(x)$ corresponding to $x = a$ and $x = b$. If Lagrange's mean value theorem is applicable over the interval $[a, b]$, then there exists at least one point on the graph between A and B, the tangent at which is parallel to (1) x-axis (2) y-axis (3) the chord AB (4) line $y = x$
57.	The rate of change of the volume of a sphere with respect to its radius r at $r = 6$ cm is (1) 144π (2) 48π (3) 432π (4) 12π
58.	The points on the curve $y = x^3$ at which the slope of the tangent is equal to the y-coordinate of the point are (1) (0, 0), (1, 3) (2) (0, 0), (2, 8) (3) (0, 0), (3, 27) (4) (0, 0), (4, 48)
59.	The point on the curve $x^2 = 2y$ in the second quadrant which is nearest to the point (0, 5) is (1) $(-2, 2)$ (2) $\left(-2\sqrt{2}, 4\right)$ (3) $\left(-1, \frac{1}{2}\right)$ (4) $\left(-\sqrt{2}, 1\right)$

Question No.	Questions
60.	If $\frac{d}{dx} f(x) = \sin 2x - 4e^{3x}$ such that $f(0) = \frac{7}{6}$, then f (x) is (1) $-\frac{1}{2}\cos 2x - \frac{4}{3}e^{3x} + 3$ (2) $\cos 2x - 4e^{3x} - \frac{11}{6}$ (3) $\frac{1}{2}\cos 2x - \frac{4e^{3x}}{3} - 3$ (4) $-\frac{1}{2}\cos 2x - \frac{4}{3}e^{3x} - 3$
61.	The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{3/2} - \left(\frac{dy}{dx}\right)^{1/2} - 4 = 0$ is (1) 6 (2) 4 (3) 3 (4) 2
62.	The number of arbitrary constants in the particular solution of a differential equation of second order is (1) 3 (2) 2 (3) 1 (4) 0
63.	The general solution of the differential equation $\frac{dy}{dx} = e^{x-y}$ is (1) $e^x - e^y = c$ (2) $e^x - e^{-y} = c$ (3) $e^{-x} - e^y = c$ (4) $e^x + e^y = c$
64.	Direction cosines of the vector $\hat{i} + \hat{j} - 2\hat{k}$ are (1) (1, 1, –2) (2) $\left(\frac{1}{2}, \frac{1}{2}, -1\right)$ (3) $\left(\frac{1}{2\sqrt{2}}, \frac{1}{2\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$ (4) $\left(\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, -\frac{2}{\sqrt{6}}\right)$

Question No.	Questions
65.	Projection of vector $2\hat{i}+3\hat{j}+2\hat{k}$ on the vector $\hat{i}+2\hat{j}+\hat{k}$ is (1) $\frac{2\sqrt{15}}{3}$ (2) $\frac{5}{3}\sqrt{6}$ (3) 10 (4) 6
66.	If $\vec{a}$ and $\vec{b}$ are two unit vectors and θ is the angle between them. Then $\vec{a}-\vec{b}$ is a unit vector if (1) $\theta=\frac{\pi}{4}$ (2) $\theta=\frac{\pi}{3}$ (3) $\theta=\frac{\pi}{2}$ (4) $\theta=\frac{2\pi}{3}$
67.	$(\vec{a}+\vec{b})\cdot(\vec{a}+\vec{b})=\lvert\vec{a}\rvert^2+\lvert\vec{b}\rvert^2$ if and only if (1) $\vec{a}=\vec{b}$ (2) $\vec{a}$ is parallel to $\vec{b}$ (3) $\vec{a}$, $\vec{b}$ are perpendicular (4) $\vec{a}+\vec{b}=0$
68.	If a line makes angles 90°, 135°, 45° with the x, y and z-axis respectively, then its direction cosines are (1) $0, \frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$ (2) $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$ (3) 1, 0, 0 (4) $0, -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$
69.	Distance of the point (0, 0, 0) from the plane $3x-4y+12z=3$ is (1) 0 (2) $\frac{1}{3}$ (3) $\frac{3}{13}$ (4) $\frac{3}{11}$

Question No.	Questions
70.	The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{6}$ (3) 0 (4) $\frac{\pi}{2}$
71.	Negation of $p \rightarrow q$ is (1) $\sim p \vee q$ (2) $p \wedge (\sim q)$ (3) $\sim q \rightarrow \sim p$ (4) $p \vee (\sim q)$
72.	Five observations are given as 25, 25, 25, 25 and 25. The mean and standard deviation of these observations are respectively (1) 5 and 5 (2) 25 and 5 (3) 25 and 25 (4) 25 and 0
73.	If the median of 11 observations is 20 and if the observations greater than the median are increased by 5, then the median of the new data will be (1) 20 (2) 25 (3) $25 + \frac{20}{11}$ (4) $25 - \frac{20}{11}$
74.	An event is called a simple event if it has (1) only two sample points of a sample space (2) more than two sample points of a sample space (3) only one sample point of a sample space (4) No sample point of a sample space

Question No.	Questions
75.	If A and B are two mutually exclusive events, then which of the following may not be true (1) occurence of any one of them excludes the occurence of the other event. (2) A and B cannot occur simultaneously (3) A and B are disjoint (4) A and B are equally likely
76.	Which of the following probabilities are not consistently defined ? (1) $P(A) = 0.5, P(B) = 0.7, P(A \cup B) = 0.6$ (2) $P(A) = 0.5, P(B) = 0.7, P(A \cap B) = 0.4$ (3) $P(A) = 0.5, P(B) = 0.4, P(A \cup B) = 0.8$ (4) $P(A) = 0.6, P(B) = 0.7, P(A \cup B) = 0.8$
77.	The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.2. If the probability of passing the English examination is 0.75, the probability of passing the Hindi examination is (1) 1 (2) 0.55 (3) 0.05 (4) 0.45
78.	The number of all possible matrices of order 3 × 3 with each entry 1 or 2 is (1) 18 (2) 27 (3) 256 (4) 512

Question No.	Questions
79.	Which of the following is not true for a square matrix A ? (1) A can be expressed as the sum of a symmetric and a skew symmetric matrix (2) If A is skew symmetric matrix, then all its diagonal elements are zero (3) $A + A'$ is a skew symmetric matrix (4) A is symmetric if $A' = A$.
80.	If $A = \begin{bmatrix} \cos 2\alpha & -\sin 2\alpha \\ \sin 2\alpha & \cos 2\alpha \end{bmatrix}$, then $A + A' = I$, if the value of α is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3) π (4) $\frac{3\pi}{2}$
81.	IQ of a person is given by the formula $IQ = \frac{MA}{CA} \times 100$, where MA is mental age and CA is chronological age. If $84 \leq IQ \leq 144$ for a group of 12 years old children, the range of their mental age is (1) $7 \leq MA \leq 12$ (2) $10.08 \leq MA \leq 17.28$ (3) $0 \leq MA \leq 12$ (4) $0 \leq MA \leq 7$

Question No.	Questions
82.	Number of different signals that can be generated by arranging at least 3 flags in order (one below the other) on a vertical staff, if five different flags are available, is (1) 15 (2) 125 (3) 243 (4) 300
83.	The least positive integer n for which ${}^{n-1}C_3 + {}^{n-1}C_4 < {}^{n}C_5$ is (1) 4 (2) 5 (3) 9 (4) 10
84.	If letters of the word RADHIK are arranged in all positive ways and are written out as in a dictionary, then the word RADHIK appears at serial number (1) 600 (2) 601 (3) 120 (4) 121
85.	For a positive integer n, the value of ${}^{n}C_0 - {}^{n}C_1 + {}^{n}C_2 - \cdots + (-1)^n . {}^{n}C_n$ is (1) 0 (2) 1 (3) -1 (4) 2^n
86.	The remainder when 2^{300} is divided by 9 is (1) 0 (2) 1 (3) 2 (4) 8
87.	If the length of sides of a right triangle are in A. P., then the sines of acute angles of the triangle are (1) $\frac{1}{3}, \frac{2}{3}$ (2) $\sqrt{\frac{3}{5}}, \sqrt{\frac{2}{3}}$ (3) $\sqrt{\frac{1}{3}}, \sqrt{\frac{2}{3}}$ (4) $\frac{3}{5}, \frac{4}{5}$

Question No.	Questions
88.	If the sum of the series $3+\frac{3}{x}+\frac{9}{x^2}+\frac{27}{x^3}+\cdots\cdots$ is finite, then (1) $-3<x<3$ (2) $-1<x<1$ (3) $\lvert x\rvert>9$ (4) $\lvert x\rvert>3$
89.	If three points (h, 0), (a, b) and (0, k) lie on a line, then (1) $\frac{a}{h}-\frac{b}{k}=1$ (2) $\frac{a}{h}+\frac{b}{k}=1$ (3) $\frac{b}{k}-\frac{a}{h}=1$ (4) $\frac{a}{h}+\frac{b}{k}=-1$
90.	The value (s) of k for which the line $(k-3)x-(4-k^2)y+k^2-7k+6=0$ is parallel to y-axis is (1) 3 (2) ± 3 (3) 6, 1 (4) ± 2
91.	If A, B, C are three non-empty sets such that $A\cap B=\phi$, $B\cap C=\phi$, then (1) $A=C$ (2) $A\subset C$ (3) $C\subset A$ (4) None of these
92.	Two finite sets have m and n elements respectively. The total number of subsets of second set is 112 more than the total number of subsets of the first set. The values of m and n respectively are (1) 7, 8 (2) 4, 7 (3) 6, 8 (4) 3, 7

Question No.	Questions
93.	The set of all second elements of the ordered pairs in a relation R from a set A to set B is called the (1) domain of the relation R (2) Range of the relation R (3) co-domain of the relation R (4) None of these
94.	Let $R = \{(x, y) : x, y \in A, x + y = 7\}$, where $A = \{1, 2, 3, 4, 5, 6, 7\}$, then (1) R is symmetric but not reflexive and not transitive (2) R is an equivalence relation (3) R is reflexive, symmetric but not transitive (4) R is not reflexive, not symmetric but is transitive
95.	Domain and range respectively of the function $f(x) = \sqrt{4 - x^2}$ are (1) $\{x : -2 \le x \le 2\}, \{x : -2 \le x \le 2\}$ (2) $\{x : -2 \le x \le 2\}, \{x : 0 \le x \le 2\}$ (3) $\{x : 0 \le x \le 2\}, \{x : -2 \le x \le 2\}$ (4) $\{x : 0 \le x \le 2\}, \{x : 0 \le x \le 2\}$
96.	Let $A = \{1, 2, 3, 4\}$, $B = \{1, 5, 9, 11, 15, 16\}$ and $f = \{(1, 5), (2, 9), (3, 1), (4, 5), (2, 11)\}$. Which of the following is true ? (1) f is a relation from A to B (2) f is a function from A to B (3) f is a relation from B to A (4) f is a function from B to A

Question No.	Questions
97.	The function $f : N \to N$ given by $f(x) = 3x$ is (1) one-one and onto (2) one-one but not onto (3) onto but not one-one (4) Neither one-one nor onto
98.	Consider a binary operation $*$ on N defined as $a * b = a^2 + b^2$. Choose the correct answer (1) $*$ is both associative and commutative (2) $*$ is associative but not commutative (3) $*$ is commutative but not associative (4) $*$ is neither commutative nor associative
99.	If $\cos 32° = m$ and $\cos x = 2m^2 - 1$; α, β are the values of x between 0° and 360°, then (1) $\alpha + \beta = 180°$ (2) $\beta - \alpha = 200°$ (3) $\beta = 4\alpha + 40°$ (4) $\beta = 5\alpha - 20°$
100.	Which of the following is true for $\tan(x+y) = \dfrac{\tan x + \tan y}{1 - \tan x \tan y}$? (1) Angles x, y are odd multiple of $\frac{\pi}{2}$ and $(x + y)$ is multiple of π (2) Angles x, y are multiple of π and $(x + y)$ is odd multiple of $\frac{\pi}{2}$ (3) None of the angles x, y and $x + y$ is an odd multiple of $\frac{\pi}{2}$ (4) None of the angles x, y and $x + y$ is a multiple of π