(Total No. of printed pages : 21)

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(PG–EE–2015)

Subject : Mathematics (Hons) Five Year Integrated

Sr. No. 10193

Code **A**

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

Roll No. ________________ (in figure) ______________________________ (in words)

Name : ____________________________ Father's Name : __________________________

Mother's Name ___________________________ Date of Examination________________

(Signature of the candidate) (Signature of the Invigilator)

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1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate **MUST NOT** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Question No.	Questions
1.	Let $X = \{x : x = n^3 + 2n + 1, n \in R\}$ and $Y = \{x : x = 3n^2 + 7, n \in R\}$ then $X \cap Y$ is a subset of (1) $\{x : x = 2n + 5, n \in N\}$ (2) $\{x : x = n^2 + n + 1, n \in N\}$ (3) $\{x : x = 7n - 1, n \in N\}$ (4) $\{x : x = 3n + 5, n \in N\}$
2.	If A and B are two sets such that $A \cap B = A \cup B$, then (1) $A \subset B$ (2) $B \subset A$ (3) $A = B$ (4) A and B are necessarily disjoint
3.	Two finite sets have n and 3 elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The value of n is (1) 7 (2) 6 (3) 5 (4) 8
4.	If $f(x) = \log_{[x-1]} \frac{\lvert x \rvert}{x}$, where [.] denotes greatest integer function, then range of f is (1) {0} (2) {1} (3) {2} (4) {3}
5.	A and B are two sets having 3 and 4 elements respectively and having 2 elements in common. The number of relations which can be defined from A to B is (1) 2^5 (2) $2^{10} - 1$ (3) $2^{12} - 1$ (4) 2^{12}
6.	Which of the following is function ? (1) $\{(x, y) : y^2 = 4ax ; x, y \in R\}$ (2) $\{(x, y) : y = \lvert x \rvert ; x, y \in R\}$ (3) $\{(x, y) : x^2 + y^2 = 1 ; x, y \in R\}$ (4) $\{(x, y) : x^2 - y^2 = 1 ; x y \in R\}$

Question No.	Questions
7.	The minimum value of $27\tan^2\theta + 3\cot^2\theta$ is (1) 9 (2) 18 (3) 27 (4) 36
8.	$\tan 200^\circ + \tan 25^\circ + \tan 200^\circ \tan 25^\circ$ is equal to (1) -1 (2) 0 (3) 1 (4) 2
9.	Let $0 < x \le \frac{\pi}{4}$, then $(\sec 2x - \tan 2x)$ equals (1) $\tan\left(x - \frac{\pi}{4}\right)$ (2) $\tan\left(\frac{\pi}{4} - x\right)$ (3) $\tan\left(x + \frac{\pi}{4}\right)$ (4) $\tan^2\left(x + \frac{\pi}{4}\right)$
10.	If $4\sin^2\theta = 1$, then values of θ are (1) $n\pi \pm \frac{\pi}{3}$ (2) $2n\pi \pm \frac{\pi}{6}$ (3) $n\pi + (-1)^n \frac{\pi}{6}$ (4) $n\pi \pm \frac{\pi}{6}$
11.	If $\cos\theta = -\frac{1}{2}$ and $0 < \theta < 360^\circ$, then the solutions are : (1) $\theta = 60^\circ, 240^\circ$ (2) $\theta = 120^\circ, 240^\circ$ (3) $\theta = 120^\circ, 210^\circ$ (4) $\theta = 120^\circ, 300^\circ$

Question No.	Questions
12.	If $a_n = \sqrt{7+\sqrt{7+\sqrt{7+...}}}$ having n radical signs then by principle of mathematical induction which of the following is true (1) $a_n > 7 \ \forall \ n \geq 1$ (2) $a_n > 3 \ \forall \ n \geq 1$ (3) $a_n < 4 \ \forall \ n \geq 1$ (4) $a_n < 3 \ \forall \ n \geq 1$
13.	If $z \neq 0$ is a complex number such that Re (z) = 0, then (1) $I_m (z^2) = 0$ (2) $I_m (z^2) = I_m (z)$ (3) $Re (z^2) = 0$ (4) $Re (z^2) = I_m (z^2)$
14.	Let α and β be the roots of the equation $x^2 + x + 1 = 0$. Then equation whose roots are α^{19}, β^7 is (1) $x^2 + x + 1 = 0$ (2) $x^2 - x - 1 = 0$ (3) $x^2 - x + 1 = 0$ (4) $x^2 + x - 1 = 0$
15.	The set of values of x (x < 1) which satisfy $5x + 2 < 3x + 8$ and $\frac{x+2}{x-1} < 4$ is (1) $(-\infty, 1)$ (2) (2, 3) (3) (0, 1) (4) (– 2, 1)
16.	Area of the region bounded by $x^2 + y^2 \leq 1, x \geq 0, y \geq 0$ is (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$

Question No.	Questions
17.	The sum $S = \frac{1}{\lfloor 9} + \frac{1}{\lfloor 3 \lfloor 7} + \frac{1}{\lfloor 5 \lfloor 5} + \frac{1}{\lfloor 7 \lfloor 3} + \frac{1}{\lfloor 9}$ equals (1) $\frac{2^9}{\lfloor 9}$ (2) $\frac{2^{10}}{\lfloor 9}$ (3) $\frac{2^9}{\lfloor 10}$ (4) $\frac{2^{10}}{\lfloor 10}$
18.	If ${}^{43}C_{r-6} = {}^{43}C_{3r+1}$, then the value of r is (1) Not possible (2) 8 (3) 10 (4) 12
19.	In an examination there are three multiple choice questions and each question has 4 choices. Number of sequences in which a student can fail to get all answers correct is (1) 11 (2) 15 (3) 80 (4) 63
20.	Which term is independent of x in the expansion of $\left(x^2 - \frac{1}{3x}\right)^9$? (1) 5^{th} term (2) 6^{th} term (3) 7^{th} term (4) 8^{th} term
21.	Total number of terms in $(2x - y + 4z)^{12}$ is (1) 13 (2) 39 (3) 65 (4) 91

Question No.	Questions
22.	The third term of a G.P. is 4. The product of first five terms is (1) 64 (2) 256 (3) 1024 (4) 4096
23.	If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is four times their product, then the value of c is (1) 2 (2) $\frac{1}{2}$ (3) 1 (4) -1
24.	The line L is given by $\frac{x}{5} + \frac{y}{b} = 1$ passes through the point (13, 32). The line K is parallel to L and has the equation $\frac{x}{c} + \frac{y}{3} = 1$. Then the distance between L and K is (1) $\frac{17}{\sqrt{15}}$ (2) $\frac{23}{\sqrt{17}}$ (3) $\frac{23}{\sqrt{15}}$ (4) $\sqrt{15}$
25.	The length of the tangent drawn from any point on the circle $x^2 + y^2 + 2gx + 2fy + \alpha = 0$ to the circle $x^2 + y^2 + 2gx + 2fy + \beta = 0$ is (1) $\sqrt{\beta - \alpha}$ (2) $\sqrt{\alpha - \beta}$ (3) $\sqrt{\alpha\beta}$ (4) $\sqrt{\alpha + \beta}$
26.	The eccentricity of an ellipse with its centre at the origin is $\frac{1}{2}$. If one of the directrix is $x = 4$, then the equation of the ellipse is (1) $4x^2 + 3y^2 = 12$ (2) $3x^2 + 4y^2 = 12$ (3) $3x^2 + 4y^2 = 1$ (4) $4x^2 + 3y^2 = 1$

Question No.	Questions
27.	The ratio in which the yz plane divides the segment joining the points (–2, 4, 7) and (3, – 5, 8) is (1) 2 : 3 (2) 3 : 2 (3) 4 : 5 (4) – 7 : 8
28.	If a line is equally inclined with the co-ordinate axes in three dimensions, then the angle of inclination is (1) $\cos^{-1}\left(\frac{1}{2}\right)$ (2) $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$ (3) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (4) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$
29.	If f (2) = 4 and f ′ (2) = 4, then $\lim_{x\to 2} \frac{x f(2) - 2 f(x)}{x-2}$ equals (1) 2 (2) – 2 (3) – 4 (4) 3
30.	$\lim_{x\to \frac{\pi}{2}} \frac{e^{\cot x} - e^{\cos x}}{\cot x - \cos x}$ is equal to (1) 1 (2) 2 (3) e (4) log x
31.	If f (x) = 2 + x when x ≥ 0 and f (x) = 2 – x when x < 0, then f (x) is (1) differentiable at x = 0 (2) non-differentiable at x = 0 (3) discontinuous at x = 0 (4) continuous as well as derivable at x = 0

Question No.	Questions
32.	The derivative of an odd function (1) is always an odd function (2) is always an even function (3) may be odd or even function (4) is neither odd nor even function
33.	Negation of '$\sqrt{5}$ is irrational or 3 is rational' is (1) $\sqrt{5}$ is rational or 3 is irrational (2) $\sqrt{5}$ is rational and 3 is rational (3) $\sqrt{5}$ is irrational and 3 is rational (4) $\sqrt{5}$ is rational and 3 is irrational
34.	Let p, q and r be the statements : p : X is a square q : X is a rectangle r : $p \rightarrow q$ contrapositive of r is (1) If X is not a rectangle then X is not a square (2) X is neither a rectangle not a square (3) X is a rectangle but not a square (4) X is a square but not a rectangle
35.	The mean of two samples of sizes 200 each were found to be 25 each. Their standard deviations were 3 and 4 respectively. The variance of the combined sample of size 400 is (1) 7 (2) 25 (3) 3.5 (4) 12.5
36.	Mean deviation of any data is least when deviations are taken from (1) Mean (2) Median (3) Mode (4) Standard deviation

Question No.	Questions
37.	An experiment yields 3 mutually exclusive and exhaustive events A, B, C. If P (A) = 2P (B) = 3P (C). Then P (A) is equal to (1) $\frac{1}{11}$ (2) $\frac{2}{11}$ (3) $\frac{3}{11}$ (4) $\frac{6}{11}$
38.	If two balls are drawn from a bag containing 3 white, 4 black and 5 red balls. Then the probability that the drawn balls are of different colours is (1) $\frac{1}{66}$ (2) $\frac{1}{22}$ (3) $\frac{4}{11}$ (4) $\frac{47}{66}$
39.	A person writes 4 letters and addresses 4 envelopes. If the letters are placed in the envelopes at random, the probability that not all the letters are placed in correct envelopes is (1) $\frac{1}{24}$ (2) $\frac{11}{24}$ (3) $\frac{5}{8}$ (4) $\frac{23}{24}$
40.	If $P(A \cap B) = \frac{1}{2}$, $P(A' \cap B') = \frac{1}{3}$, P (A) = p and P (B) = 2p then value of p is (1) $\frac{1}{3}$ (2) $\frac{7}{18}$ (3) $\frac{4}{9}$ (4) $\frac{1}{2}$

Question No.	Questions
41.	Let A = {1, 2, 4}. Which of the following relations on A is reflexive ? (1) $R_1 = \{(1, 1), (2, 2), (2, 4)\}$ (2) $R_2 = \{(1, 1,), (2, 2), (2, 4), (4, 2)\}$ (3) $R_3 = \{(1, 1), (2, 2), (2, 4), (4, 4)\}$ (4) $R_4 = \{(1, 1), (2, 2), (2, 4), (4, 1), (2, 1)\}$
42.	The function defined by $f : Z \to Z$ defined by $f(x) = x^2$ is (1) one-one but not onto (2) onto but not one-one (3) neither one-one nor onto (4) both one-one and onto
43.	Let $*$ be a binary operation on the set R defined by $a * b = a + b + ab$; $a, b \in R$. Then solution of the equation $2 * (3 * x) = 7$ is (1) $x = -\frac{1}{3}$ (2) $x = -3$ (3) $x = \frac{1}{3}$ (4) $x = 3$
44.	Range of $\operatorname{cosec}^{-1} x$ is (1) $R - (-1, 1)$ (2) $(-1, 1)$ (3) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (4) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$
45.	If $x \in R - (-1, 1)$, then $\sec^{-1} x + \sin^{-1} \frac{1}{x}$ is (1) $\frac{\pi}{2}$ (2) 0 (3) π (4) $\frac{\pi}{4}$

Question No.	Questions
46.	$\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is equal to (1) $\frac{3\pi}{4}$ (2) $\frac{\pi}{4}$ (3) $\frac{7\pi}{4}$ (4) $-\frac{\pi}{4}$
47.	$\tan^{-1}1+\tan^{-1}2+\tan^{-1}3$ is equal to (1) 0 (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) π
48.	If $A=\begin{bmatrix} x & 3 & 2 \\ -3 & y & -7 \\ -2 & 7 & 0 \end{bmatrix}$ and $A=-A'$, then $x+y$ is equal to (1) 12 (2) 2 (3) 0 (4) –1
49.	If A and B are symmetric matrices, then AB – BA is a (1) symmetric matrix (2) skew-symmetric matrix (3) null matrix (4) identity matrix
50.	Let $A=[5\ \ 3]$ and $B=[3\ \ 7]$. The number of non-zero matrices C such that $AC=BC$ is (1) 0 (2) 1 (3) 2 (4) infinitely many

Question No.	Questions
51.	If A and B are two matrices such that AB = B and BA = A, then $A^2 + B^2$ is equal to (1) 2AB (2) 2BA (3) A + B (4) AB
52.	If $A(\alpha) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then $A(\alpha)\,A(\beta)$ is equal to (1) $A(\alpha) - A(\beta)$ (2) $A(\alpha) + A(\beta)$ (3) $A(\alpha - \beta)$ (4) $A(\alpha + \beta)$
53.	If A and B are two 3 × 3 matrices, then which one of the following is not true ? (1) $(A + B)' = A' + B'$ (2) $(AB)' = A'B'$ (3) det (AB) = det (A) det (B) (4) $A(\text{adj } A) = \|A\| I_3$
54.	Suppose A is a square matrix such that $A^3 = I$, then $(A + I)^3 + (A - I)^3 - 6A$ equals (1) I (2) 2I (3) A (4) 3A
55.	Let A be a square matrix of order 3 such that |adj A| = 100, then |A| equals (1) ±10 (2) 100 (3) 10000 (4) $(100)^{1/3}$
56.	If $A \neq A^2 = I$, then det (I + A) is equal to (1) 0 (2) –1 (3) 1 (4) 2

Question No.	Questions
57.	The system of equations $2x + 3y = 7$ and $14x + 21y = 49$ has (1) Infinitely many solutions (2) a unique solution (3) no solution (4) two solutions
58.	Inverse of $\begin{pmatrix} 5 & 2 \\ 3 & 1 \end{pmatrix}$ is (1) $\begin{pmatrix} 1 & -2 \\ -3 & 5 \end{pmatrix}$ (2) $\begin{pmatrix} 1 & -3 \\ -2 & 5 \end{pmatrix}$ (3) $\begin{pmatrix} -1 & 2 \\ 3 & -5 \end{pmatrix}$ (4) $\begin{pmatrix} -1 & 3 \\ 2 & -5 \end{pmatrix}$
59.	Determinant of a skew-symmetric matrix of even order is (1) 0 (2) –ve (3) 1 (4) Non-zero perfect square
60.	If $A' = -A$, where A is a 3×3 matrix, then $\|A\|$ is equal to (1) -1 (2) 0 (3) 1 (4) 2
61.	The function $f(x) = \begin{cases} 0, & \text{if } x \text{ is irrational} \\ 1, & \text{if } x \text{ is rational} \end{cases}$ is (1) continuous at $x = 1$ (2) discontinuous at $x = 0$ (3) continuous at $x = 0$ (4) discontinuous everywhere

Question No.	Questions
62.	Differential coefficient of $e^{\sin^{-1}x}$ w.r.t. $\sin^{-1}x$ is (1) $\sin^{-1}x$ (2) $e^{\sin^{-1}x}$ (3) $e^{\sin^{-1}x}\cdot\frac{1}{\sqrt{1-x^2}}$ (4) $e^{\cos^{-1}x}$
63.	If $y = (x^2 + 1)^{\sin x}$ then $y'(0)$ is equal to (1) $\frac{1}{2}$ (2) e^2 (3) 0 (4) $\frac{3}{2}$
64.	If $x = at^2$, $y = 2at$ then $\frac{d^2y}{dx^2}$ is equal to (1) $-\frac{1}{t^2}$ (2) $-\frac{1}{2at^3}$ (3) $-\frac{2a}{t}$ (4) $-\frac{1}{t^3}$
65.	On the curve $y = x^2$, the point at which the tangent is parallel to the chord joining (0, 0) and (1, 1) is (1) $\left(\frac{1}{2}, 4\right)$ (2) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (3) (2, 4) (4) $\left(2, \frac{1}{4}\right)$

Question No.	Questions
66.	If $2^x + 2^y = 2^{x+y}$, then the value of $\frac{dy}{dx}$ at $x = y = 1$ is (1) 0 (2) –1 (3) 1 (4) 2
67.	The smallest value of M such that $\lvert x^2 - 3x + 2 \rvert \le M$ for all x in the interval $\left[1, \frac{5}{2}\right]$ is (1) $\frac{1}{4}$ (2) $\frac{3}{4}$ (3) $\frac{5}{4}$ (4) $\frac{5}{16}$
68.	The normal to the circle $x^2 + y^2 - 2x - 2y = 0$ passing through (2, 2) is (1) $x = y$ (2) $2x + y - 6 = 0$ (3) $x + 2y - 6 = 0$ (4) $x + y - 4 = 0$
69.	Let $f(x) = x \log x + 3x$. Then $f(x)$ (1) increases on (e^{-4}, ∞) (2) decreases on $(0, \infty)$ (3) increases on $(0, \infty)$ (4) decreases on $(0, e^{-2})$
70.	The value of $\int \frac{dx}{\sqrt{e^{2x} - 1}}$ is (1) $\sin^{-1}(e^x) + c$ (2) $\cos^{-1}(e^x) + c$ (3) $\tan^{-1}(e^x) + c$ (4) $\sec^{-1}(e^x) + c$

Question No.	Questions
71.	$\int \frac{dx}{x^2+x+1}$ is equal to (1) $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+c$ (2) $\frac{2}{\sqrt{3}}\cot^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+c$ (3) $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+c$ (4) $\frac{\sqrt{3}}{2}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)+c$
72.	$\int_2^3 \frac{dx}{x^2-x}$ is equal to (1) $\log\left(\frac{2}{3}\right)$ (2) $\log\left(\frac{1}{4}\right)$ (3) $\log\left(\frac{4}{3}\right)$ (4) $\log\left(\frac{8}{3}\right)$
73.	$\int_0^{\sqrt{2}} [x^2]\,dx$ is equal to (1) $2-\sqrt{2}$ (2) $2+\sqrt{2}$ (3) $\sqrt{2}-1$ (4) $\sqrt{2}-2$
74.	Let $f(x) = \int e^x (x-1)(x-2)\,dx$. Then f decreases in the interval (1) $(-\infty, -2)$ (2) $(-2, -1)$ (3) $(1, 2)$ (4) $(2, \infty)$

Question No.	Questions
75.	The value of $\int_0^1 x(1-x)^{99}\,dx$ is (1) $\frac{1}{10100}$ (2) $\frac{11}{10100}$ (3) $\frac{1}{10010}$ (4) $\frac{11}{10010}$
76.	Let f be an odd function then $\int_{-1}^{1}(\lvert x\rvert + f(x)\cos x)\,dx$ is equal to (1) 0 (2) 1 (3) 2 (4) 4
77.	Value of $\int_{-\pi}^{\pi} x^{10}\sin^7 x\,dx$ is (1) 0 (2) $\frac{2\pi^{11}}{88}$ (3) π (4) 2π
78.	The area of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is (1) 5π (2) 6π (3) 13π (4) $\frac{13\pi}{4}$
79.	Area common to the curves $y^2 = x$ and $x^2 = y$ is (1) 1 (2) $\frac{2}{3}$ (3) $\frac{1}{3}$ (4) $\frac{16}{3}$

Question No.	Questions
80.	The area bounded by $y = [x]$ and the lines $x = 1$ and $x = 1.7$ is (1) 0 (2) $\frac{2.89}{2}$ (3) $\frac{17}{10}$ (4) $\frac{7}{10}$
81.	The order and degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2} = \frac{d^2y}{dx^2}$ are (1) 1, 2 (2) 2, 1 (3) 2, 2 (4) 2, $\frac{3}{2}$
82.	The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ is (1) $x + y = \frac{x^2}{2} + c$ (2) $x - y = \frac{1}{3}x^3 + c$ (3) $xy = \frac{x^4}{4} + c$ (4) $y - x = \frac{x^4}{4} + c$
83.	The equation of the curve passing through (3, 9) which satisfies $\frac{dy}{dx} = x + \frac{1}{x^2}$ is (1) $6xy = 3x^3 - 6x + 29$ (2) $6xy = 3x^2 - 29x + 6$ (3) $6xy = 3x^3 + 29x - 6$ (4) $6xy = 3x^2 + 6x - 29$
84.	If the points with position vectors $10\hat{i}+3\hat{j}$, $12\hat{i}-5\hat{j}$ and $\lambda\hat{i}+11\hat{j}$ are collinear, then λ is equal to (1) 22 (2) 12 (3) 8 (4) 4

Question No.	Questions
85.	If the vectors $\vec{a}, \vec{b}$ and $\vec{c}$ form the sides BC, CA and AB respectively of a triangle ABC, then (1) $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}=0$ (2) $\vec{a}\times\vec{b}=\vec{b}\times\vec{c}=\vec{c}\times\vec{a}$ (3) $\vec{a}.\vec{b}=\vec{b}.\vec{c}=\vec{c}.\vec{a}$ (4) $\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}=\vec{0}$
86.	The projection of the vector $\vec{a}=3\hat{i}-\hat{j}-2\hat{k}$ on the vector $\vec{b}=\hat{i}+2\hat{j}-3\hat{k}$ is (1) $\frac{\sqrt{14}}{2}$ (2) $\frac{14}{\sqrt{2}}$ (3) $\sqrt{14}$ (4) 7
87.	A line passes through the points (6, – 7, – 1) and (2, – 3, 1). If the angle α which the line makes with the positive direction of x-axis is acute, the direction cosines of the line are (1) $\frac{2}{3}, \frac{-2}{3}, -\frac{1}{3}$ (2) $\frac{2}{3}, \frac{2}{3}, -\frac{1}{3}$ (3) $\frac{2}{3}, \frac{-2}{3}, \frac{1}{3}$ (4) $\frac{2}{3}, \frac{2}{3}, \frac{1}{3}$
88.	A plane which passes through the point (3, 2, 0) and the line $\frac{x-4}{1}=\frac{y-7}{5}=\frac{z-4}{4}$ is (1) $x-y+z=1$ (2) $x+y+z=5$ (3) $x+2y-z=1$ (4) $2x-y+z=5$
89.	The distance between the line $\vec{r}=2\hat{i}-2\hat{j}+3\hat{k}+\lambda(\hat{i}-\hat{j}+4\hat{k})$ and the plane $\vec{r}.(\hat{i}+5\hat{j}+\hat{k})=5$ is (1) $\frac{3}{10}$ (2) $\frac{10}{3}$ (3) $\frac{10}{\sqrt{3}}$ (4) $\frac{10}{3\sqrt{3}}$

Question No.	Questions
90.	The lines $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and $\frac{x-1}{-2}=\frac{y-2}{-4}=\frac{z-3}{-6}$ are (1) parallel (2) intersecting (3) skew (4) coincidental
91.	The angle between the lines x = 1, y = 2 and y = – 1, z = 0 is (1) 90° (2) 30° (3) 60° (4) 6°
92.	The region which is common to all constraints of a linear programming problem is called (1) feasible region (2) optimal feasible region (3) infeasible region (4) unbounded region
93.	The bounded feasible region corresponding to a set of linear constraints in a linear programming problem is always (1) concave region (2) convex region (3) Non-convex region (4) optimum region
94.	A point in the feasible region of a linear programming problem for which the objective function is maximized or minimized is called (1) bounded solution (2) unbounded solution (3) optimal solution (4) feasible solution
95.	A bag contains four tickets marked with numbers 112, 121, 211, 222. One ticket is drawn at random from the bag. Let E_i (i = 1, 2, 3) denote the event that i^{th} digit on the ticket is 2. Then which of the following is not true ? (1) E_1 and E_2 are independent (2) E_2 and E_3 are independent (3) E_3 and E_1 are independent (4) E_1, E_2, E_3 are independent

Question No.	Questions
96.	For two events A and B if P (A) = $P(A\|B)=\frac{1}{4}$ and $P(B\|A)=\frac{1}{2}$, then (1) A is subevent of B (2) A and B are mutually exclusive (3) A and B are independent and $P(\overline{A}\|B)=\frac{1}{4}$ (4) A and B are independent and $P(\overline{A}\|B)=\frac{3}{4}$
97.	There are two coins-one unbiased and the other two headed, but otherwise they are identical. One of the coin is chosen at random and tossed, head turns up. What is the probability that two-headed coin was chosen ? (1) $\frac{3}{4}$ (2) $\frac{1}{2}$ (3) $\frac{1}{3}$ (4) $\frac{2}{3}$
98.	In a binomial distribution, the probability of getting a success is $\frac{1}{4}$ and standard deviation is 3. Then its mean is (1) 6 (2) 8 (3) 12 (4) 10
99.	If in a Binomial distribution with n = 4, P (X = 0) = $\frac{16}{81}$, then P (X = 4) is equal to (1) $\frac{1}{8}$ (2) $\frac{1}{81}$ (3) $\frac{1}{27}$ (4) $\frac{1}{16}$
100.	The number of times a fair coin must be tossed so that the probability of getting at least one head is at least 0.95 is (1) 12 (2) 7 (3) 6 (4) 5

(A)

PG/EE/ 2015 / Mathematics (Hons)   **Set No. - I**

ANSWER - KEY

1	2	3	4	5	6	7	8	9	10
3	3	2	1	4	2	2	3	2	4
11	12	13	14	15	16	17	18	19	20
2	3	1	1	1	4	3	4	4	3
21	22	23	24	25	26	27	28	29	30
4	3	1	2	1	2	1	3	3	1
31	32	33	34	35	36	37	38	39	40
2	2	4	1	4	2	4	4	4	2
41	42	43	44	45	46	47	48	49	50
3	3	1	4	1	4	4	3	2	4
51	52	53	54	55	56	57	58	59	60
3	4	2	2	1	1	1	3	4	2
61	62	63	64	65	66	67	68	69	70
4	2	3	2	2	2	2	1	1	4
71	72	73	74	75	76	77	78	79	80
1	3	3	3	1	2	1	2	3	4
81	82	83	84	85	86	87	88	89	90
3	3	3	3	2	1	1	1	4	4
91	92	93	94	95	96	97	98	99	100
1	1	2	3	4	4	4	3	2	4

~~Q/Booklet of code A alongwith~~
A/Key of 5-year Integ. M.Sc. (Hons.) Maths Entrance-2015 (of code-A) is forwarded for f.n.a., please.

Sandal

Director, UCC.