(Total No. of printed pages : 21)

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(PG–EE–2015)

Subject : Math & Maths with Computer Science

Sr. No. 10085

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)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

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.	$\lim_{\theta \to \pi/4} \frac{\sin\theta - \cos\theta}{\theta - \pi/4} =$ (1) $\frac{1}{\sqrt{2}}$ (2) $\sqrt{2}$ (3) 1 (4) $\frac{1}{2}$
2.	If $y = (\sin^{-1} x)^2$, then $(1 - x^2) y_2 - xy_1 =$ (1) 2 (2) 1 (3) 2y (4) $\sin^{-1} x$
3.	Asymptotes parallel to co-ordinate axes of the curve $y = x\, e^{1/x} - 1$ are : (1) $x = 0, y = -x$ (2) $x = 0, y = 1$ (3) $y = 0, x = 1$ (4) $x = 0, y = x$
4.	The radius of curvature at any point t of the curve $x = a(t + \sin t)$, $y = a(1 - \cos t)$ is : (1) $4a \sin \frac{t}{2}$ (2) $4a \cos t$ (3) $4a \cos \frac{t}{2}$ (4) $2a \cos \frac{t}{2}$
5.	The origin for the curve $a^4 y^2 = x^4 (x^2 - a^2)$ is : (1) Node (2) Cusp (3) Conjugate point (4) Point of inflexion

Question No.	Questions
6.	The volume of the solid generated by the revolution of the plane area bounded by $y^2 = 9x$ and $y = 3x$ about the x-axis is : (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{2\pi}{3}$ (4) $\frac{3\pi}{2}$
7.	The co-ordinates of the centre of the conic $5x^2 + 5y^2 + 6xy + 4x + 12y - 4 = 0$ are : (1) $\left(\frac{1}{2}, \frac{3}{2}\right)$ (2) $\left(\frac{1}{2}, -\frac{3}{2}\right)$ (3) $\left(\frac{1}{2}, -\frac{2}{3}\right)$ (4) $\left(-\frac{1}{2}, \frac{3}{2}\right)$
8.	The equation of a circle with radius $\frac{a}{2}$ and touching the initial line at pole is : (1) $r = a \sin\theta$ (2) $r = \frac{a}{2}\sin\theta$ (3) $r = 2a\sin\theta$ (4) $r = a$
9.	A variable plane through a fixed point (a, b, c) cuts the co-ordinate axes in the points A, B, C. The locus of the centre of the sphere OABC is : (1) $ax + by + cz = 2$ (2) $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = \frac{1}{2}$ (3) $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 2$ (4) $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$

Question No.	Questions
10.	Vertex of the cone $$x^2 - 2y^2 + 3z^2 - 4xy + 5yz - 6zx + 8x - 19y - 2z - 20 = 0$$ is : (1) (1, –2, 3) (2) (1, 2, –3) (3) (1, –2, –3) (4) (1, 2, 3)
11.	Solution of $e^y\,dx + (1 + x\,e^y)\,dy = 0$ is : (1) $xy + e^y = c$ (2) $x + e^y = c$ (3) $x\,e^y + y = c$ (4) $x\,e^y - y = c$
12.	Solution of $y = xp + \frac{a}{p}$ is : (1) $y = cx + \frac{x}{a}$ (2) $y = cx + \frac{a}{c}$ (3) $y = cx + \frac{a}{x}$ (4) $y = ax + c$
13.	The P.I. of $(D^2 + 2)\,y = x^2 e^{3x}$ is : (1) $\frac{e^{3x}}{11}\left(x^2 + \frac{12}{11}x - \frac{50}{121}\right)$ (2) $\frac{e^{3x}}{11}\left(x^2 - \frac{12}{11}x + \frac{50}{121}\right)$ (3) $\frac{e^{3x}}{11}\left(x^2 - \frac{12}{11}x + \frac{30}{121}\right)$ (4) $\frac{e^{3x}}{11}\left(x^2 + \frac{12}{11}x - \frac{30}{121}\right)$

Question No.	Questions
14.	The orthogonal trajectories of the family of parabolas $y^2 = 4ax$ are : (1) $y^2 = 4x + \frac{c}{a}$ (2) $x^2 + 2y^2 = c$ (3) $2x^2 + y^2 = c$ (4) $x^2 = 4ay + c$
15.	Solution of $z(1 - z^2)\,dx + z\,dy - (x + y + xz^2)\,dz = 0$ is : (1) $\frac{x+y}{z} - xz = c$ (2) $\frac{x+y}{z} + xz = c$ (3) $\frac{y+z}{x} - yz = c$ (4) $\frac{y+z}{x} + yz = c$
16.	For the given vectors $\hat{i}+2\hat{j}+\hat{k}$, $\lambda\hat{i}+2\hat{j}-7\hat{k}$ and $5\hat{i}+6\hat{j}-5\hat{k}$ to be coplanar, value of λ is : (1) -4 (2) -3 (3) 4 (4) 3
17.	If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $r = \lvert\vec{r}\rvert$, then $\nabla\left(\frac{1}{r}\right) =$ (1) $\frac{\vec{r}}{r^3}$ (2) $\frac{\vec{r}}{r^2}$ (3) $\frac{-\vec{r}}{r^2}$ (4) $\frac{-\vec{r}}{r^3}$
18.	Value of 'a' so that the vector field given by $(2x^2y^2 + z^2)\,\hat{i} + (3xy^3 - x^2z)\,\hat{j} + (axy^2z + xy)\,\hat{k}$ is solenoidal, is : (1) $\frac{13}{7}$ (2) $-\frac{13}{7}$ (3) -13 (4) 13

Question No.	Questions
19.	If $\vec{f} = 4xy\,\hat{i} + yz\,\hat{j} - xy\,\hat{k}$ and region V is bounded by x = 0, x = 2, y = 0, y = 2, z = 0, z = 2, then $\iiint_V \nabla.\vec{f}\, dV =$ (1) 60 (2) 50 (3) 40 (4) 30
20.	If $\vec{f} = y^2\,\hat{i} + x^2\,\hat{j} - (x+z)\,\hat{k}$ and C is the boundary of the triangle with vertices (0, 0, 0), (1, 0, 0) and (1, 1, 0), then $\oint_C \vec{f}.d\vec{r} =$ (1) $\frac{1}{3}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$
21.	A system of m linear homogeneous equations in n variables of the type AX = 0 has a unique solution if rank of matrix A is : (1) less than n (2) equal to n (3) equal to m (4) equal to mn
22.	A bilinear form when subjected to linear transformation, reduces to : (1) Bilinear form (2) Linear form (3) Normal form (4) Canonical form
23.	In the cubic equation $x^3 + 3Px + Q = 0$, if $Q^2 + 4P^3 < 0$, then the roots of the cubic are : (1) Real and Imaginary (2) Imaginary (3) Real and equal (4) Real

Question No.	Questions
24.	If Descarte's rule of signs is used to find the roots of f (x) = 0, then we get information about : (1) Minimum number of real roots (2) Minimum number of imaginary roots (3) Maximum number of imaginary roots (4) All of the above
25.	The condition that one root of the equation $ax^3 + bx^2 + cx + d = 0$ be equal to the sum of the other two, is : (1) $b^3 - 4abc - 8a^2d = 0$ (2) $b^3 + 4abc - 8a^2d = 0$ (3) $b^3 - 4abc + 8a^2d = 0$ (4) $b^3 + 4abc + 8a^2d = 0$
26.	If ϕ is the Euler's function, then ϕ (27) is : (1) Even (2) Odd (3) Niether even nor odd (4) Can't say
27.	One quadratic residue of 7 is : (1) 2 (2) 3 (3) 5 (4) 6
28.	If $ca \equiv cb \pmod m$, then $a \not\equiv b \pmod m$, if c and m are : (1) Relative prime (2) Twin primes (3) Primes and equal (4) Distinct primes
29.	Value of $\log(-3)$ is : (1) $\log 3 - i\pi$ (2) $\log 3 + i\pi$ (3) $\log 3 + 2i\pi$ (4) $\log 3 - 2i\pi$

Question No.	Questions
30.	Value of $(\cos\alpha + i\sin\beta)^{-n}$ is : (1) $(\cos\alpha - i\sin\beta)^{n}$ (2) $\cos n\alpha - i\sin n\beta$ (3) $\cos n\alpha + i\sin n\beta$ (4) None of the above
31.	For the function $f(x) = (x-1)^{2/5}$ on (0, 3), Rolle's theorem is (1) applicable, c = 2 (2) applicable, c = 2.5 (3) applicable, c = 1.5 (4) not applicable
32.	$\lim_{x \to 0}\left(\frac{1}{x^2} - \frac{1}{\sin^2 x}\right) =$ (1) $\frac{1}{3}$ (2) $-\frac{1}{3}$ (3) $-\frac{1}{2}$ (4) $\frac{1}{2}$
33.	If $u = f(x+2y) + g(x-2y)$, then $\frac{\partial^2 u}{\partial y^2} =$ (1) $\frac{\partial^2 u}{\partial x^2}$ (2) $\frac{1}{4}\frac{\partial^2 u}{\partial x^2}$ (3) $2\frac{\partial^2 u}{\partial x^2}$ (4) $4\frac{\partial^2 u}{\partial x^2}$
34.	If $u = \tan^{-1}\frac{x^3+y^3}{x-y}$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} =$ (1) $2\sin 2u$ (2) $\frac{1}{2}\sin 2u$ (3) $\sin 2u$ (4) $\sin\frac{u}{2}$

Question No.	Questions
35.	Maximum value of the function $f(x, y) = 3x^2 - y^2 + x^3$ is : (1) 7 (2) 3 (3) 2 (4) 4
36.	The plane through tangent and binormal to the curve at a point is called : (1) tangent plane (2) osculating plane (3) normal plane (4) rectifying plane
37.	Solution of the partial differential equation $y^2zp + zx^2q = xy^2$ is : (1) $f(x^2 - y^2, x^2 - z^2) = 0$ (2) $f(x^3 - y^3, x^2 - z^2) = 0$ (3) $f(x^3 - y^3, x - z) = 0$ (4) $f(x^2 - y^2, x - z) = 0$
38.	Complete integral of $f(p, q) = 0$ by Charpit method, is : (1) $z = ax + by + cxy$ (2) $z = ax^2 + by^2 + c$ (3) $z = ax - by$ (4) $z = ax + by + c$
39.	Solution of $xr + 2p = 0$ is : (1) $z = f_1(y) + \frac{1}{x} f_2(y)$ (2) $z = f_1(y) + x f_2(y)$ (3) $z = f_1(y) - x f_2(y)$ (4) $z = f_1(y) - \frac{1}{x} f_2(y)$
40.	The equation $u_{xx} + 2u_{yy} + u_{zz} = 2u_{xy} + 2u_{yz}$ is : (1) Hyperbolic (2) Elliptic (3) Parabolic (4) None of these

Question No.	Questions
41.	Solution of p + q = sin x + sin y is : (1) z = a (x – y) + cos x – cos y + b (2) z = a (x + y) – cos x + cos y + b (3) z = a (x – y) – (cos x + cos y) + b (4) z = a (x – y) + cos x + cos y + b
42.	Two equal forces act on a particle, if the square of their resultant is equal to three times their product, then the angle between them is : (1) $\pi/3$ (2) $\pi/4$ (3) $\pi/6$ (4) $\pi/2$
43.	"The algebraic sum of the moments of two coplanar forces (not forming a couple) about any point in their plane is equal to the moment of their resultant about that point". This result is known as : (1) Lami's theorem (2) Varignon's theorem (3) Moment theorem (4) Law of moments
44.	If three forces acting on a rigid body be represented in magnitude, direction and line of action by the sides of a triangle, taken in order, then they are equivalent to a couple whose moment is equal to : (1) Twice the area of the triangle (2) Thrice the area of the triangle (3) Half the area of the triangle (4) Area of the triangle
45.	If a body is slightly displaced but still remains in equilibrium in any position, then such equilibrium is called : (1) Perfect equilibrium (2) Unstable equilibrium (3) Stable equilibrium (4) Neutral equilibrium

Question No.	Questions
46.	Which of the following methods has the fastest rate of convergence ? (1) Secant method (2) Bisection method (3) Newton-Raphson method (4) Regula-Falsi method

47.	What is the output of the following program ?
	main ()
	{
	int a = 30, b = 4 ;
	a = a % b ;
	a = a/b ;
	printf ("% d % d", a, b) ;
	}
	(1) 0, 4 (2) 7, 4
	(3) 1, 4 (4) 30, 4

48.	What is the value of x ? int x = 2, y = 5 ; x = ++ x + y – – ; (1) 5 (2) 9 (3) 7 (4) 8
49.	Which command is used to skip the rest of a loop and carry on from top of the loop again ? (1) break (2) continue (3) switch (4) goto
50.	The expression (* p) . x is equal to : (1) $p \rightarrow x$ (2) $p \rightarrow .x$ (3) $* p \rightarrow x$ (4) p . x

Question No.	Questions
51.	Solution of the Bessel's equation $$x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+(x^2-n^2)y=0,$$ when n is not an integer, is y = (1) $c_1 J_n(x) + c_2 Y_n(x)$ (2) $c_1 J_n(x) + c_2 J_{-n}(x)$ (3) $c_1 Y_n(x) + c_2 Y_{-n}(x)$ (4) $c_1 J_{-n}(x) + c_2 Y_n(x)$
52.	If $H_n(x)$ denotes Hermite polynomial of degree n, then $H_1(x) =$ (1) 2x (2) – 2x (3) x (4) 3x
53.	$L(e^{at} t^n) = \frac{\lfloor n}{(s-a)^{n+1}}$, provided that (1) n is a positive integer and $s \geq a$ (2) n is an integer and $s < a$ (3) n is a non-negative integer and $s > a$ (4) n is real and $s \leq a$
54.	$L^{-1}\left(\frac{1}{\sqrt{s}}\right) =$ (1) $\frac{\pi}{\sqrt{t}}$ (2) $\frac{1}{\sqrt{\pi t}}$ (3) $\frac{1}{\pi\sqrt{t}}$ (4) $\frac{2}{\sqrt{\pi t}}$

Question No.	Questions
55.	Fourier transform of $f(t) = \begin{cases} e^{-at}, & t > 0 \\ 0, & t < 0, \end{cases}$ where a > 0, is : (1) $\frac{\pi}{a+s}$ (2) $\frac{\pi}{a+is}$ (3) $\frac{1}{a+s}$ (4) $\frac{1}{a+is}$
56.	Derived set of any set is : (1) Open set (2) Closed set (3) Open and Closed set (4) Can't say
57.	If $<I_n>$ is a sequence of closed intervals such that (i) $I_{n+1} \subseteq I_n \; \forall \; n \in N$ (ii) $\lim_{n \to \infty}$ (length of I_n) = 0, then $\bigcap_{n=1}^{\infty} I_n$ is : (1) empty (2) non-singleton (3) singleton (4) None of the above
58.	If $\sum_{n=1}^{\infty} a_n$ is convergent series of positive terms then $\sum_{n=1}^{\infty} n\, a_n$ is : (1) Convergent (2) Divergent (3) Oscillatory (4) Convergent or divergent
59.	The series $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{n^5}$ is : (1) Absolutely convergent (2) Conditionally convergent (3) Divergent (4) Oscillatory

Question No.	Questions
60.	If $a_n \geq 0$ and $\sum_{n=1}^{\infty} a_n$ is divergent, then $\pi_{n=1}^{\infty} (1+a_n)$ is : (1) Divergent (2) Convergent (3) Absolutely convergent (4) Oscillatory
61.	Which of the following is incorrect ? (1) $E = 1 + \Delta$ (2) $1 - E^{-1} = \nabla$ (3) $\Delta = (1 - \nabla)^{-1}$ (4) $\delta = E^{1/2} - E^{-1/2}$
62.	The third divided difference with arguments 2, 4, 9, 10 of the function $f(x) = x^3 - 2x$ is : (1) 2 (2) 1 (3) 0 (4) 3
63.	Recurrence formula for Binomial distribution is : (1) $P(r+1) = \frac{n-r}{r+1} P(r)$ (2) $P(r+1) = \frac{n-r}{r} P(r)$ (3) $P(r+1) = \frac{n-r}{r+1} \frac{p}{q} P(r)$ (4) $P(r+1) = \frac{n-r}{r} \frac{p}{q} P(r)$
64.	The most probable limits for a normal variate having mean μ and standard deviation σ, are : (1) $2\mu \pm 3\sigma$ (2) $\mu \pm \sigma$ (3) $\mu \pm 2\sigma$ (4) $\mu \pm 3\sigma$
65.	Euler's method is also called : (1) Polygon method (2) Linear method (3) Fast method (4) Corrector method

Question No.	Questions
66.	The number of plane rotations required to make a matrix of order n to its tridiagonal form, is : (1) $\frac{1}{2} n(n-2)$ (2) $\frac{1}{2} n(n-1)$ (3) $(n-1)(n-2)$ (4) $\frac{1}{2}(n-1)(n-2)$
67.	If ϕ be the angle which the tangent at a point makes with the radius vector, then the relation between angular velocity w and linear velocity v is : (1) $w = \frac{v \cos\phi}{r}$ (2) $w = \frac{v \sin\phi}{r}$ (3) $w = r v \sin\phi$ (4) $w = \frac{v \tan\phi}{r}$
68.	With usual notations, expression for transverse acceleration is : (1) $2\dot{r}\dot{\theta} + r\ddot{\theta}$ (2) $r\ddot{\theta} + \dot{r}\dot{\theta}$ (3) $2r\ddot{\theta} + \dot{r}\dot{\theta}$ (4) $2\dot{r}\dot{\theta} - r\ddot{\theta}$
69.	If T_1 and T_2 are the initial and final tensions in an elastic string with modulus λ, then the work done in stretching it, is : (1) $W = \frac{1}{2\lambda}(T_2 - T_1)$ (2) $W = \frac{2}{\lambda}(T_2^2 - T_1^2)$ (3) $W = \frac{1}{2\lambda}(T_2^2 - T_1^2)$ (4) $W = \frac{1}{\lambda}(T_2^2 - T_1^2)$

Question No.	Questions
70.	If a body of mass m moving with velocity v impinges on another body of mass M, which is at rest and is free to move in any direction, then the loss of kinetic energy is : (1) $\frac{1}{2}\frac{M}{m+M}v^2$ (2) $\frac{1}{2}\frac{m}{m+M}v^2$ (3) $\frac{1}{2}(m+M)v^2$ (4) $\frac{1}{2}\frac{mM}{m+M}v^2$
71.	If the maximum horizontal range for a projectile is 'a', then the greatest height attained is : (1) $\frac{a}{4}$ (2) $\frac{a}{3}$ (3) $\frac{a}{2}$ (4) $\frac{1}{2}a^2$
72.	A particle moves in an ellipse under a force which is always directed to its focus, then the velocity at any point of the path, with usual notations, is : (1) $v^2=\frac{1}{\mu}\left(\frac{2}{r}-\frac{1}{a}\right)$ (2) $v^2=\mu\left(\frac{2}{r}-\frac{1}{a}\right)$ (3) $v^2=2\mu\left(\frac{2}{r}-\frac{1}{a}\right)$ (4) $v^2=\frac{\mu}{2}\left(\frac{2}{r}-\frac{1}{a}\right)$
73.	Number of generators of a finite cyclic group of order 53 are : (1) 51 (2) 52 (3) 53 (4) 54
74.	How many inner automorphism can be defined for an abelian group ? (1) 3 (2) 2 (3) 1 (4) 0

Question No.	Questions
75.	If f : G → G^1 is group homomorphism, then f is one-one if Kernel f is : (1) empty (2) singleton set (3) any set (4) singleton set of identity element
76.	A ring will not be an integral domain if the ring is : (1) commutative (2) with unit element (3) without zero divisor (4) with zero divisor
77.	If f : (R, + , ·) → (R^1, + , ·) is an onto homomorphism and S denotes ideal other than Ker f, then : (1) $R^1 \cong R/S$ (2) $R \cong R^1/S$ (3) $R^1 \cong R/\text{Ker f}$ (4) $R \cong R^1/\text{Ker f}$
78.	In the group of natural numbers w.r.t. addition, order of 12 is : (1) 2 (2) 3 (3) 1 (4) None of the above
79.	An element in a principal ideal domain is prime element if it is : (1) irreducible (2) reducible (3) reducible and irreducible (4) none of these
80.	If d (x, y) is the usual metric defined for x, y ∈ [0, 1], then the open ball centred at O with radius $\frac{1}{4}$ is given by : (1) $\left(0, \frac{1}{4}\right)$ (2) $\left(0, \frac{1}{4}\right]$ (3) $\left[0, \frac{1}{4}\right)$ (4) $\left[0, \frac{1}{4}\right]$

Question No.	Questions
81.	$\int_0^1 x^{m-1}(1-x)^{n-1}\,dx$ converges if and only if : (1) $m > 0, n > 0$ (2) $m \geq 0, n \geq 0$ (3) $m \geq 0, n > 0$ (4) $m > 0, n \geq 0$
82.	Which of the following statements about connectedness of sets in metric space is not true ? (1) Empty set is connected in every metric space (2) Every singleton set is connected in any metric space (3) Every subset having at least two points of a metric space is not connected (4) None of these
83.	Which of the following statements about completeness of a metric space is wrong ? (1) Every complete subspace of a metric space is closed (2) Every closed subspace of a complete metric space is complete (3) The usual metric space (R, d) is not complete (4) None of these
84.	In usual metric space (R, d), closure of [0, 1] is : (1) (0, 1) (2) [0, 1] (3) ϕ (4) {0, 1}
85.	Estimated value of $I = \int_0^1 e^{x^2}\,dx$ is : (1) $-1 \leq I \leq e$ (2) $1 \leq I \leq e$ (3) $1 \leq I < e^2$ (4) $1 < I < e$

Question No.	Questions
86.	If f is a bounded function having infinite points of discontinuity, then f is Riemann integrable if limit points of set of discontinuties are (1) finite (2) Infinite (3) not existing (4) In all these cases
87.	If $x = a \cos u \cosh v$, $y = a \sin u \sinh v$, then $\frac{\partial(x,y)}{\partial(u,v)} =$ (1) $a^2 (\cos 2u - \cosh 2v)$ (2) $a^2 (\sin 2u - \sinh 2v)$ (3) $\frac{a^2}{2} (\cos 2u - \cosh 2v)$ (4) $\frac{a^2}{2} (\sin 2u - \sinh 2v)$
88.	$\int_0^{\pi/2} (\tan x)^n \, dx =$ (1) $\frac{\pi}{2} \operatorname{cosec} \frac{n\pi}{2}$ (2) $\frac{\pi}{2} \sec \frac{n\pi}{2}$ (3) $\pi \sec \frac{n\pi}{2}$ (4) $\frac{\pi}{2} \sec n\pi$
89.	If f is bounded and integrable on $[-\pi, \pi]$ and α_n, β_n are its Fourier co-efficients, then $\sum_{n=1}^{\infty} (\alpha_n^2 + \beta_n^2)$ is : (1) $< \frac{1}{\pi} \int_{-\pi}^{\pi} f^2 \, dx$ (2) $\leq \frac{2}{\pi} \int_{-\pi}^{\pi} f^2 \, dx$ (3) $\leq \frac{1}{\pi} \int_{-\pi}^{\pi} f^2 \, dx$ (4) $\leq \int_{-\pi}^{\pi} f^2 \, dx$

Question No.	Questions
90.	If Fourier co-efficients of f (t) are C_n, then Fourier co-efficients of $\overline{f(t)}$ are : (1) $\overline{C}_{-n}$ (2) $\overline{C}_n$ (3) $-\overline{C}_n$ (4) $-\overline{C}_{-n}$
91.	Exponential transformation $w = e^z$ transforms horizontal line segments onto : (1) Rays (2) Circles (3) Ellipses (4) Polygons
92.	The function $f(z) = \bar{z}$ is : (1) Differentiable at origin (2) Differentiable everywhere (3) Nowhere differentiable (4) Not defined
93.	For the function $f(z) = 2x^2 + y + i(y^2 - x)$, the points (region) where C – R equations are satisfied, are given by : (1) the line $x = 2y$ (2) the line $y = 2x$ (3) Every point of z–plane (4) No point exists
94.	For the function $f(z) = z - e^{-z} + 1 - i$, the points where the mapping $w = f(z)$ is not conformal, are given by : (1) $z = \frac{1}{2}(2n+1)\pi i, n = 0, \pm 1, \pm 2, ...$ (2) $z = n\pi, n = 0, \pm 1, \pm 2, ...$ (3) $z = n\pi i, n = 0, \pm 1, \pm 2 .....$ (4) $z = (2n+1)\pi i, n = 0, \pm 1, \pm 2 ......$

Question No.	Questions
95.	If $T : R^2 \to R^3$ is a linear transformation such that $T(x, y) = (x - y, y - x, -x)$, then nullity of T is : (1) x (2) 3 (3) 2 (4) 0
96.	If W_1 and W_2 are subspaces of a vector space V, then $W_1 \cup W_2$: (1) is a subspace of V (2) can never be a subspace of V (3) may or may not be a subspace of V (4) is a superspace of V
97.	If u and v are two linearly dependent vectors of inner product space, then which of the following statement is not true ? (1) u = a v, a is constant (2) $\|u + v\| = \|u\| + \|v\|$ (3) $\lvert\langle u, v\rangle\rvert = \|u\|\,\|v\|$ (4) all are true
98.	Every vector space has how many trivial subspaces ? (1) 2 (2) 3 (3) 1 (4) 0
99.	The real vector space of all polynomial functions over R is : (1) One-dimensional (2) Two-dimensional (3) Finite-dimensional (4) Infinite-dimensional
100.	If W_1 and W_2 are subspaces of a finite-dimensional vector space and A (W) denotes annihilator of W, then which of the following statements is not true ? (1) $A(W_1 + W_2) = A(W_1) \cap A(W_2)$ (2) $A(W_1) + A(W_2) \subset A(W_1 \cap W_2)$ (3) $A(W_1 \cap W_2) = A(W_1) + A(W_2)$ (4) None of the above

(A)

PG/EE/ 2015 / Maths & Maths with Computer Science **Set No. - I**

ANSWER - KEY ← A

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

Q/Booklet of code-A alongwith A/Key of code A of M.Sc Maths/M.Sc. Maths with computer Science is is forwarded for f.n.a, please.

Sd/-

Director, UCC