Subject Code : 612 Section Code : 1->Mathematics Difficulty: 1

Subject Code	Q Id	Questions	Answer Key
612	1	A compact subset of R is (A) $(0,1)$ (B) $[0,1)$ (C) $(0,1]$ (D) $[0,1]$	(D)
612	2	Which of the following function is periodic? (A) $\sin x$ (B) e^x (C) $\log x$ (D) $\sin^{-1} x$	(A)
612	3	$I = \int_0^a \frac{f(x)dx}{f(x)+f(a-x)} =$ (A) $f(a)$ (B) $f(2a)$ (C) 0 (D) $a/2$	(D)
612	4	If $A=\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$, then A^n, for $n \in \mathbb{N}$ is equal to (A) $2^{n-1}A$ (B) $2^n A$ (C) nA	(A)

		(D) nI	
612	5	If $y=\sqrt{\cos x+\sqrt{\cos x+\sqrt{\cos x+....}}}$, then $\frac{dy}{dx}$ is (A) $\frac{\sin x}{1-2y}$ (B) $\frac{\sin x}{2y-1}$ (C) $\frac{\cos x}{1-2y}$ (D) $\frac{\cos x}{2y-1}$	(A)
612	6	For the function $f(z)=\sin(1/z)$, $z=0$ is (A) an essential singularity (B) a branch point (C) a removable singularity (D) a simple pole	(A)
612	7	The partial differential equation $u_{xx}-xu_{yy}=0$ is (A) elliptic, $x>0$ (B) hyperbolic, $x<0$ (C) hyperbolic, $x>0$ (D) None of the above	(C)
612	8	The value of $\lim_{x\to\frac{\pi}{4}}\frac{\int_{2}^{\sec^2 x} f(t)\,dt}{x^2-\frac{\pi^2}{16}}$ is (A) $8\frac{f(2)}{\pi}$ (B)	(A)

		$2\sec^2 x$ (C) $\frac{f(2)}{\pi}$ (D) $f(2)$	
612	9	If $\int_{\sin x}^{1} t^2 f(t)\, dt = 1 - \sin x$, then $f(2)$ is (A) $\frac{1}{9}$ (B) $\frac{1}{4}$ (C) 4 (D) 16	(B)
612	10	The derivative of e^{x^2} with respect to x^4 is (A) $\frac{e^{x^2}}{2x^2}$ (B) $\frac{e^{x}}{2}$ (C) $\frac{e^{x^2}}{3x^2}$ (D) $\frac{e^{x^2}}{3x}$	(A)
612	11	Consider the functions $f(x) = x\tan x$ and $g(x) = x\cos x^2$. Then (A) both f and g are odd functions (B) f is even function and g is odd (C) both f and g are even functions (D) f is odd function and g is even	(B)
612	12	The domain and range of the function $f(x) = \sin^{-1} x$ are respectively given by	(A)

		(A) $[-1,1]$ and $(-\infty,\infty)$ (B) $[-1,1]$ and $[0,\pi]$ (C) $[-1,1]$ and $[0,\pi/2]$ (D) $[-1,1]$ and $[\pi, 2\pi]$	
612	13	The value of $\sqrt{i}$ is (A) $1+i$ (B) $1-i$ (C) -1 (D) $\pm\frac{1+i}{\sqrt{2}}$	(D)
612	14	If $x = e^t, y = \sin t, z = \cos t$ and $u = \log(x+y+y)^2$, then $\frac{du}{dt}$ is (A) $\frac{2(e^t + \cos t - \sin t)}{(e^t + \cos t + \sin t)}$ (B) $\frac{(e^t + \cos t - \sin t)}{2(e^t + \cos t + \sin t)}$ (C) $\frac{2(e^t + \cos t + \sin t)}{(e^t + \cos t - \sin t)}$ (D) $\frac{2(e^t - \cos t + \sin t)}{(e^t + \cos t - \sin t)}$	(A)
612	15	The value of $\left((i^{999})^2 + \left(\frac{1}{i^{-2003}}\right)^2\right)^2$ is (A) -4 (B) 4 (C) -1	(B)

		(D) 1	
612	16	The intersection of $\{x: \lvert x^2-26\rvert \le 10\}$ and $\{x: \lvert x^2-5\rvert \le 4\}$ (A) is a closed interval (B) is an open interval (C) is empty (D) contains exactly 4 points	(C)
612	17	If in a group, an element a has order 65, then the order of a^{25} is (A) 5 (B) 12 (C) 13 (D) 7	(C)
612	18	A harmonic conjugate $v(x,y)$ of the function $u(x,y)=x^3-3xy^2$ on $\mathbb{C}$ is (A) y^3-3x^3+c (B) $3x^2y-y^3+c$ (C) x^3-3x^2y+c (D) $y^2-3xy+c$	(B)
612	19	If $\left(\frac{1-i}{1+i}\right)^{100}=a+ib$, then (A) $a=2,\ b=-1$ (B) $a=1,\ b=0$ (C) $a=0,\ b=1$ (D) $a=-1,\ b=2$	(B)
612	20		(C)

		Which of the following functions is continuous but not differentiable? (A) x (B) e^x (C) $\lvert x \rvert$ (D) $\sin x$	
612	21	In which of the following subspaces, the sequence $\left\{\frac{1}{n}\right\}$ is Cauchy but not convergent? (A) $[0,1]$ (B) $[0,1)$ (C) $(0,1]$ (D) $(0,1)$	(C)
612	22	If $f(x)=1+\frac{\log x}{1!}+\frac{(\log x)^2}{2!}+\ldots$, then $\int f(x)dx$ is (A) $\log x+c$ (B) e^2+c (C) $x+c$ (D) $\frac{x^2}{2}+c$	(D)
612	23	If $F(1)=2$ and $F(n)=F(n-1)+\frac{1}{2}$ for all integers $n>1$, then $F(51)=$ (A) 25 (B) 26 (C) 27 (D) 28	(C)
612	24		(C)

		The value of $\int_C \frac{e^z dz}{z^4}$ when C is $\lvert z\rvert = 1$ is (A) $\frac{8\pi i}{3}$ (B) $\frac{4\pi i}{3}$ (C) $\frac{\pi i}{3}$ (D) $\frac{2\pi i}{3}$	
612	25	For each x in $[0, 1]$, let $f(x) = x$ if x is rational and $f(x) = 1 - x$ if x is irrational. Then (A) $f(x+1) = f(x)$ (B) $f(x) - f(1-x) = 1$ (C) $f(1-x) - f(x) = 1$ (D) $f(x) + f(1-x) = 1$	(D)
612	26	The area under one arc of the cycloid $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ (A) $\frac{\pi a^2}{8}$ (B) $\frac{3\pi a^2}{16}$ (C) $3\pi a^2$ (D) $\frac{3\pi a^2}{32}$	(C)
612	27	If A is a self adjoint matrix, then its diagonal entries are (A) all complex numbers (B) all real numbers (C) 0	(B)

		(D) -1	
612	28	The differential equation obtained by eliminating f from $z=f\left(x^2+y^2\right)$ when $p=\frac{\partial z}{\partial x}$ and $q=\frac{\partial z}{\partial y}$ is (A) $py=qx$ (B) $pq=xy$ (C) $px=qy$ (D) $x=y$	(A)
612	29	The differential equation of the family of curves $y=e^{2x}\left(A\cos x+B\sin x\right)$ where A and B are constants is (A) $\frac{d^2y}{dx^2}-4\frac{dy}{dx}+4y=0$ (B) $\frac{d^2y}{dx^2}-4\frac{dy}{dx}\div 5y=0$ (C) $\frac{d^2y}{dx^2}-4y\frac{dy}{dx}+5y=0$ (D) $\frac{d^2y}{dx^2}-4\frac{dy}{dx}\div 4x=0$	(B)
612	30	The value of $\lim_{x\to\infty}\int_0^x e^{-t^2}\,dt$ is (A) $\sqrt{\pi}$ (B) $\sqrt{\frac{\pi}{2}}$ (C) $\frac{\sqrt{\pi}}{2}$ (D) π	(C)
612	31	If $u=\tan^{-1}\left(\frac{y}{x}\right)$, then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$ is equal to (A)	(C)

		$\frac{2xy}{x^2+y^2}$ (B) 1 (C) 0 (D) $\frac{x^2}{x^2+y^2}$	
612	32	The residue of $\frac{z^2}{(z-1)(z-2)(z-3)}$ at $z=1$ is (A) -8 (B) 1/2 (C) -6 (D) 0	(B)
612	33	If R is a commutative ring and $N=\{x\in R : x^n = 0$ for some integer $n\}$, then (A) N is an ideal of R (B) N is not an ideal of R (C) N is a subring of R (D) N is a subfield of R	(A)
612	34	The common area in square units between the curves $y^2=4x$ and $x^2=4y$ is (A) $\frac{16}{5}$ (B) $\frac{16}{3}$ (C) $\frac{8}{3}$ (D) $\frac{8}{5}$	(B)
612	35		(C)

		The value of $(1+i)(1+i^2)(1+i^3)(1+i^4).......(1+i^n)$ for $n>1$ is (A) 1 (B) -1 (C) 0 (D) i	
612	36	The function $f(x)=\frac{x^2-x}{x}$ is (A) continuous everywhere (B) continuous except at $x=0$ (C) continuous at $x=0$ (D) discontinuous everywhere	(A)
612	37	$\frac{d}{dx}\int_{\sin^2 x}^{2\sin x} e^{t^2} dt$ at $x=\pi$ is (A) 1 (B) -1 (C) 2 (D) -2	(D)
612	38	A ring in which the nonzero elements form a group is called (A) an integral domain (B) a skew-field (C) a field (D) commutative ring	(B)
612	39	$\mathbb{R}^n$ is not a field when (A) $n=1$ (B)	(C)

		$n=2$ (C) $n>1$ (D) n is prime	
612	40	The period of the function $f(x)=3-2\cos^2\left(\frac{\pi x}{3}\right)$ (A) 2 (B) 3 (C) 5 (D) 6	(B)
612	41	If $f(x)=\int_0^x e^{-t^2}dt$, then $f'(x)$ is (A) 0 (B) e^{-t^2} (C) e^{-x^2} (D) $e^{-t^2}+c$	(C)
612	42	Suppose f is continuous on $[a,b]$, differentiable on (a,b) and $f(a)=f(b)$. Then for some $c\in(a,b)$, we have (A) $f(a)=f(c)$ (B) $f(b)=f(c)$ (C) $f(c)=\frac{f(b)-f(c)}{b-c}$ (D) $f'(c)=0$	(D)
612	43	The sum of all the external forces on a system of particles is zero. Which of the following must be true of the system? (A) The total mechanical energy is constant (B)	(B)

		The total linear momentum is constant (C) The total kinetic energy is constant (D) The total potential energy is constant	
612	44	In a field a bull is grazing around a tree in an elliptical path having the tree at a focus. The shortest and the longest distance from the bull and the tree are 200 and 500 units. The eccentricity of the path is (A) 3/7 (B) 7/3 (C) 1/3 (D) 5/7	(A)
612	45	The solution of the boundary value problem $y''+4y=0, y(0)=1, y(\pi)=1$ is (A) $y=\cos 2x$ (B) $y=0$ (C) $y=\cos 2x+A\sin 2x$, where A is arbitray (D) $y=\sin 2x$	(C)
612	46	Which of the following surface intersects the plane $x=2$ at a parabola? (A) $-\frac{z^2}{2}=\frac{x^2}{9}+\frac{y^2}{4}$ (B) $\frac{z}{4}=\frac{x}{4}+\frac{y}{9}-1$ (C) $\frac{z}{2}=\frac{x^2}{9}-\frac{y^2}{4}$ (D) $\frac{z^2}{4}=\frac{x^2}{9}+\frac{y^2}{4}+1$	(C)
612	47	An integer solution of $(1-i)^x=2^{\frac{x}{2}}$ is given by (A) 8	(A)

		(B) 1 (C) 6 (D) 2	
612	48	Let P be the point $(1,0)$ and let Q be a point on the locus $y^2 = 4x$. The locus of mid point of PQ is (A) $y^2 + 2x + 1 = 0$ (B) $y^2 - 2x + 1 = 0$ (C) $x^2 - 2y + 1 = 0$ (D) $x^2 + 2y + 1 = 0$	(B)
612	49	The angle between the lines $6x = 3y = 4z$ and $2x = -y = z$ (A) $\frac{\pi}{3}$ (B) 0 (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$	(D)
612	50	If α, β are the roots of the equation $x^2 - 2x + 4 = 0$, then $\alpha^6 + \beta^6$ is equal to (A) 64 (B) -64 (C) 0 (D) -128	(C)
612	51	Let $f(x) \in R[x] = \{a_0 + a_1x + ... + a_nx^n : a_i \in R$, a ring and n is a non-negative integer$\}$. If $f(a) = f'(a) = 0$, then $(x-a)^2$ divides (A) $f(x)$	(A)

		(B) $f'(x)$ (C) $f(x)-a$ (D) $f'(x)-a$	
612	52	If a group G is such that $(a\cdot b)^2 = a^2\cdot b^2$, then G is (A) non-abelian (B) abelian (C) cyclic (D) non-cyclic	(B)
612	53	If $f(x)=2x^3+x^2+2x+2$ and $g(x)=2x^2+2x+1$ are in $Z_3[x]$, then $f(x)+g(x)$ is (A) $2x^3+3x^2+4x+3$ (B) $2x^3+x$ (C) $3x^3+4x+3$ (D) $2x^3+x^2+2x+2$	(B)
612	54	If three forces acting at a point are in equilibrium, then they can be represented in magnitude and direction by (A) the medians of a triangle (B) the sides of a triangle (C) the altitudes of a triangle (D) the perpendicular bisectors of a triangle	(B)
612	55	Let G be group of order 49. Then (A) G is abelian (B) G is cyclic (C)	(A)

		G is non-abelian (D) centre of G has order 7	
612	56	Let $\lambda = e^{\frac{5\pi i}{6}}$. Then the smallest positive integer n such that $\lambda^n = 1$ is (A) 6 (B) 9 (C) 12 (D) 5	(C)
612	57	If $f(x)$ is an odd function and $g(x)$ is an even function, then (A) $f \circ g$ is odd (B) $f \circ g$ is even (C) $f \circ f$ is even (D) $g \circ g$ is odd	(B)
612	58	Let $f(z) = \sin\left(\frac{1}{1-z}\right)$. Then $z = 1$ is a (A) non-isolated essential singularity (B) removable singularity (C) isolated essential singularity (D) analytic	(C)
612	59	Let P and Q be square matrices such that $PQ = I$, the identity matrix. Then zero is an eigen value of (A) P but not of Q (B) Q but not of P (C) Both P and Q	(D)

		(D) Neither P nor Q	
612	60	A root of the equation $e^x = 4x$ lies between (A) -1 and 0 (B) 1 and 2 (C) 1 and 3 (D) 3 and 4	(C)
612	61	The value of $\nabla^2 \log r$ is equal to (A) $\frac{1}{r}$ (B) $\frac{1}{r^2}$ (C) $-\frac{1}{r^2}$ (D) r^2	(C)
612	62	$\bigcup_{n=1}^{\infty}\left[1-\frac{1}{n}, 1+\frac{1}{n}\right] =$ (A) $[0,2]$ (B) $[0,1]$ (C) $[1,2]$ (D) $\{1\}$	(A)
612	63	If $x = e^{y+e^{y+\cdots}}$, then $\frac{dy}{dx}$ is (A) $\frac{x(1-x)}{y}$ (B) $\frac{y}{x(1-x)}$	(C)

		(C) $\frac{1-x}{x}$ (D) e^{x+y}	
612	64	The value of $\int_C \frac{\sin z}{z}dz$, when C is $\lvert z\rvert=1$, is (A) 1 (B) π (C) 0 (D) -1	(C)
612	65	The residue of $\frac{1}{\left(z^2+1\right)^3}$ at $z=i$ is (A) $\frac{5}{16i}$ (B) $\frac{3}{13i}$ (C) $\frac{3}{16i}$ (D) $\frac{5}{13i}$	(C)
612	66	The inverse transform of $T(z)=\frac{z+2}{z+3}$ is (A) $\frac{2-3\omega}{\omega-1}$ (B) $\frac{2+3\omega}{\omega-1}$ (C) $\frac{2-3\omega}{\omega+1}$ (D) $\frac{2+3\omega}{\omega+1}$	(A)
612	67		(B)

		Which of the following equations is exact? (A) $\frac{dy}{dx} = \frac{\left(x^2 - 2xy + 3y^2\right)}{\left(y^2 + 6xy - x^2\right)}$ (B) $\frac{dy}{dx} = -\frac{\left(x^2 - 2xy + 3y^2\right)}{\left(y^2 + 6xy - x^2\right)}$ (C) $\frac{dy}{dx} = \frac{\left(e^y \sin x\right)}{e^y \left(\sin x + 1\right)}$ (D) $\frac{dy}{dx} = -\frac{\left(e^y \sin x\right)}{e^y \left(\sin x + 1\right)}$	
612	68	The unit normal to the surface $x^2 + y^2 + z^2 = 6$ at the point $(2,1,1)$ is (A) $2\vec{i} - \vec{j} + \vec{k}$ (B) $\frac{1}{\sqrt{6}}\left(2\vec{i} + \vec{j} + \vec{k}\right)$ (C) $\frac{1}{6}\left(2\vec{i} + \vec{j} + \vec{k}\right)$ (D) $\frac{1}{\sqrt{6}}\left(2\vec{i} - \vec{j} + \vec{k}\right)$	(B)
612	69	The solution of $\frac{d^2y}{dx^2} = 1 + y$ which vanishes at $x = 0$ and tends to a finite limit as $x \to \infty$ is (A) $\left(1 + e^{-x}\right)$ (B) $\left(e^{-x} - 1\right)$ (C) $\left(e^{x} + e^{-x} - 2\right)$ (D) $\left(e^{x} - 1\right)$	(B)
612	70	If $1, \omega, \omega^2$ are cube roots of unity, then $(1+\omega)^3 - (1+\omega^2)^3$ is (A) 1 (B)	(C)

		-1 (C) 0 (D) 2	
612	71	The solution of the differential equation $x\frac{dy}{dx}+y=x^2$ is (A) $3y=x^2+\frac{c}{x}$ (B) $y=\frac{x^3}{3}+c$ (C) $x^2y=\frac{x^3}{3}+c$ (D) $xy=c$	(A)
612	72	The set $[0,1]$ is (A) countable (B) countably finite (C) uncountable (D) countably infinite	(C)
612	73	The function $f(x)=\begin{cases}1 & x \text{ is rational} \\ -1 & x \text{ is reational}\end{cases}$ is (A) continuous at $x=0$ (B) discontinuous everywhere (C) discontinuous only at $x=0$ (D) continuous at $x=\frac{1}{2}$	(B)
612	74	The point $z=0$ of $f(z)=\frac{z+3}{z^2(z^2+2)}$ is (A) an isolated singularity	(A)

		(B) a removable singularity (C) an essential singularity (D) None of the above	
612	75	The solution of $zp + x = 0$ is (A) $x^2 + z^2 = \phi(y)$ (B) $x^2 z^2 = \phi(y)$ (C) $(x-y)^2 = \phi(y)$ (D) $(x+y)^2 = \phi(y)$	(A)
612	76	The solution of the initial value problem $x\frac{dy}{dx} = 3y,\ y(1) = 3$ is (A) $y = x^3$ (B) $y^3 = x$ (C) $y = 3x^3$ (D) $3y^3 = x$	(C)
612	77	If $\bar{a}$ and $\bar{b}$ are two unit vectors and θ is the angle between them, then $(\bar{a} - \bar{b})$ is a unit vector if (A) $\theta = \pi/6$ (B) $\theta = \pi/4$ (C) $\theta = \pi/3$ (D) $\theta = 2\pi/3$	(C)
612	78	Which of the following is the order of a non-abelian group? (A) 4 (B) 8	(B)

		(C) 9 (D) 13	
612	79	Let S_4 be the group of permutations on four letters. The number of elements of order 2 in the group S_4 is (A) 6 (B) 9 (C) 4 (D) 12	(B)
612	80	If the entries of a 2 × 2 matrix A are defined by the formula $a_{ij} = i^2 + j^2$, then A is (A) a symmetric matrix (B) a skew symmetric matrix (C) the identity matrix (D) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$	(A)
612	81	Which of the following formula is false? (A) $\|z_1 z_2\| = \|z_1\|\|z_2\|$ (B) $\arg z_1 z_2 = \arg z_1 + \arg z_2 \mod 2\pi$ (C) $\|z_1 + z_2\| \le \|z_1\| + \|z_2\|$ (D) $\arg(z_1 + z_2) = \arg z_1 + \arg z_2 \mod 2\pi$	(D)
612	82	Which of the following functions $f : R \to R$ is one-one and onto? (A) $f(x) = x^3 + 2$ (B) $f(x) = \sin x$ (C) $f(x) = \cos x$	(A)

		(D) $f(x) = x^4 - x^2$	
612	83	If $I_n = \left(-\frac{1}{n}, \frac{1}{n}\right)$, $n \in \mathbb{N}$, then $\bigcap_{n=1}^{\infty} I_n$ is (A) open (B) not open (C) neither open nor closed (D) unbounded set	(B)
612	84	If $I = \int_0^{\pi/2} \sin^8 x dx$ and $J = \int_0^{\pi/2} \cos^8 x dx$, then the value of I / J is (A) $5\pi/16$ (B) $5\pi/32$ (C) π (D) 1	(D)
612	85	The Laplace transform of $\frac{\sin at}{at}$ is (A) $\tan\left(\frac{a}{s}\right)$ (B) $\tan^{-1}\left(\frac{a}{s}\right)$ (C) $\frac{\pi}{2} - \tan^{-1}\left(\frac{a}{s}\right)$ (D) $\frac{\pi}{2} - \tan\left(\frac{s}{a}\right)$	(C)
612	86	The value of $\int_{-1}^{+1} x d\lvert x \rvert$ is (A) -1 (B) 1 (C)	(B)

		0 (D) 2	
612	87	Let there be three distinct prime numbers C, A , T such that the product $C \times A \times T = 2014$. The possible value of the sum $C + A + T$ is (A) 58 (B) 74 (C) 109 (D) 214	(B)
612	88	a,b,c (a>c) are three digits, from left to right, of a three digit number. If the number with these digits reversed is subtracted from the original number, the resulting number has digit 4 in its unit place. The other two digits from left to right are (A) 5 and 4 (B) 5 and 9 (C) 4 and 5 (D) 9 and 5	(B)
612	89	If 3^{2015} is divided by 11, then the remainder is (A) 0 (B) 1 (C) 4 (D) 5	(B)
612	90	If 12 divides ab313ab, the smallest value of a + b is (A) 2 (B) 4 (C) 6 (D) 7	(B)

612	91	The sum to infinity of the G.P. −5/4 , 5 /16 , -5/64 , ……. is (A) −1 (B) 0 (C) 25/ 256 (D) ∞	(A)
612	92	The cube roots of 1 are in (A) A.P. (B) G.P. (C) H.P (D) A.P. but not H.P.	(B)
612	93	The greatest number of three digits which when added to 45 is exactly divisible by 6, 8, 12 is (A) 963 (B) 987 (C) 999 (D) 1044	(B)
612	94	The cube roots of 8 are (A) 2, −2 (B) $2, 2i, 2i^2$ (C) $2, -2, 2i$ (D) $2, 2w, 2w^2$	(D)
612	95	The amplitude of $(-1)^5$ is (A) $\pi/2$ (B)	(D)

		$\pi/4$ (C) $3\pi/2$ (D) π	
612	96	The principle value of the amplitude of $-1 + i\sqrt{3}$ i (A) $\pi/2$ (B) $\pi/3$ (C) $2\pi/3$ (D) π	(C)
612	97	If 1, ω, ω^2 are three roots of unity, then $(3 + \omega^2 + \omega^4)^6$ is (A) 0 (B) 2 (C) 64 (D) 729	(C)
612	98	The complex number 1 + i in the polar form is (A) $(2, \pi/2)$ (B) $(\sqrt{2}, \pi/4)$ (C) $(3, 2\pi/3)$ (D) $(\sqrt{3}, \pi/4)$	(B)
612	99	The value of $(1 + i)^6 + (1 - i)^6$ is (A) 32 (B) 8 (C) 1 (D) 0	(D)
612	100		(A)

		The coefficient of x^{99} in the expansion $(x-1)(x-2)\ldots(x-100)$ is (A) -5050 (B) -4950 (C) -4851 (D) -100	
612	101	The imaginary part of $\sin(x+iy)$ is (A) $\sin x \cosh y$ (B) $i \sin x \sinh y$ (C) $\cos x \cosh y$ (D) $\cos x \sinh y$	(D)
612	102	If $a > 0$, $b > 0$, $c > 0$, then the correct symbol in …… to the following $a^2 + b^2 + c^2$ …… $ab + bc + ca$ is (A) $<$ (B) $>$ (C) $\leq$ (D) $\geq$	(D)
612	103	The diagonal of a cube is $\sqrt{12}$ cm. The volume of the cube in cubic cms. is (A) $3\sqrt{2}$ (B) $12\sqrt{12}$ (C) 24 (D) 8	(D)
612	104	If $a-b=3$ and $a^3-b^3=117$, then $a+b$ is equal to (A) 39 (B) 29	(D)

		(C) 9 (D) 7	
612	105	If $x \div 1/x = 3$, then $x^4 + 1/x^4$ is equal to (A) 279 (B) 168 (C) 81 (D) 47	(D)
612	106	The maximum value of $4 - x - x^2$ is (A) 10 (B) 4 (C) $\frac{21}{4}$ (D) $\frac{17}{4}$	(D)
612	107	The value of $\log_3 \log_2 \log_{\sqrt{8}} 81$ is equal to (A) 1 (B) 7 (C) 11 (D) 22	(A)
612	108	If $x = \log 3/4$, $y = \log 4/7$, $z = 2\log\sqrt{(7/4)}$, then the value of $13^{2(x+y+z)}$ is (A) 1 (B) 7 (C) 11 (D) 22	(A)

612	109	The number of solutions of the equation $x^{\log_e x} = 100x$ is (A) 0 (B) 1 (C) 2 (D) 3	(C)
612	110	The value of cot 9° cot27° cot63° cot81° is (A) 1 (B) $\sqrt{2}/3$ (C) $1/\sqrt{2}$ (D) 1/2	(A)
612	111	If $\sin 2\theta = \cos\theta$, then the value of θ is (A) $\pi/2$ (B) $\pi/4$ (C) $3\pi/2$ (D) π	(C)
612	112	The value of $\frac{\sin 2x}{1+\cos 2x}$ is equal to (A) $\sin x$ (B) $\cos x$ (C) $\tan x$ (D) $\cot x$	(C)
612	113	If $\sin x \cos y = 1/4$ and $3 \tan x = \tan y$, then the value of $\sin(x + y)$ is equal to (A) 0 (B) 1	(B)

		(C) 3 (D) 4	
612	114	ABC is a right-angled triangle with $\angle B = 90°$. M is the midpoint of AC and $BM = \sqrt{117}cm$. Sum of the other two sides AB and BC is 30cm. The area of the triangle in sq.cms. is (A) 27 (B) 108 (C) 110 (D) 112	(B)
612	115	The area of the region in the Cartesian plane whose points (x, y) satisfy $\|x\| + \|y\| + \|x + y\| \leq 2$ is (A) 2 (B) 2.5 (C) 3 (D) 4	(C)
612	116	The equation of tangent to the circle $x^2 + y^2 = 85$ at the point (7, 6) is (A) $7x - 6y = 85$ (B) $6x + 7y = \sqrt{85}$ (C) $6x - 7y = \sqrt{85}$ (D) $7x + 6y = 85$	(D)
612	117	The equation of the normal of $y^2 = 20x$ at (5 ,10) is (A) $7x - 6y = 85$ (B) $6x + 7y = \sqrt{85}$ (C) $6x - 7y = \sqrt{85}$ (D) $7x + 6y = 85$	(B)

612	118	The centre of an ellipse $9x^2 + 5y^2 - 36x - 50y - 164 = 0$ is at (A) (2,5) (B) (1,–2) (C) (–2,1) (D) (0,0)	(A)
612	119	If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, then $(A - A^t)$, [where A^t is transpose of matrix A], is (A) null matrix (B) identity matrix (C) symmetric (D) skew-symmetric	(D)
612	120	The value of the determinant $\begin{vmatrix} x & 1 & y+z \\ y & 1 & z+x \\ z & 1 & x+y \end{vmatrix}$ (A) $x+y+z$ (B) 0 (C) 1 (D) $1+x+y+z$	(B)
612	121	Let M and N be two non-empty subsets of a set X such that M is not a subset of N. Then (A) N is a subset of M (B) M and the complement of N are non-disjoint (C) M and N are disjoint (D) M is not a subset of the complement of N	(B)
612	122	If $X = \{2, 4, 6, 8\}$ and $Y = \{2, 3, 4, 5\}$ be two sets, then the symmetric difference of X and Y is the set (A) { 6,8 }	(D)

		(B) { 3, 5} (C) {2,4,3,5} (D) { 3,5,6,8}	
612	123	Out of 84 students , the number of students taking Mathematics is 65 and the number of students taking both Mathematics and Statistics is 20. Then the number of students taking only Statistics is (A) 19 (B) 39 (C) 45 (D) 64	(B)
612	124	The number of integers between 1 and 6300 inclusive which are divisible neither by 5 nor by 3 is (A) 5040 (B) 3360 (C) 2100 (D) 1260	(B)
612	125	A book-self holds 5 different computer books, 6 different statistics books and 10 different mathematics books. The number of ways selecting 2 books, one in two subjects is (A) 300 (B) 260 (C) 140 (D) 60	(C)
612	126	Which of the properties is not satisfied for the relation defined by $R = \{ (a, b) : a, b \in Z$, the set of integers, $\|a - b\| \leq 3 \}$. (A) reflexive (B) symmetric (C) transitive	(C)

		(D) symmetric and transitive	
612	127	If the functions f and g are defined by f = { (5,2), (6,3)} and g = {(2,5), (3,6) }, then the value of $(f \circ g)(2)$ is (A) 2 (B) 3 (C) 5 (D) 6	(A)
612	128	Let $f(x)$ be a polynomial of degree 1. If $f(10) - f(5) = 15$, then $f(20) - f(5)$ is (A) 25 (B) 40 (C) 45 (D) 65	(C)
612	129	If $\frac{^nP_5}{^nP_3} = 20$, then value of $n =$ (A) 2 (B) 8 (C) 12 (D) 15	(B)
612	130	$^nC_1 + {}^nC_2 \div {}^nC_3 + \ldots + {}^nC_n =$ (A) $^{2n}C_n$ (B) $^{n+1}C_n$ (C) 2^n (D) $2^n - 1$	(D)
612	131	$^{50}C_{11} + {}^{50}C_{12} + {}^{51}C_{13} - {}^{52}C_{13} =$	(D)

		(A) ${}^{52}C_{14}$ (B) ${}^{53}C_{13}$ (C) $2^{53}C_{12}$ (D) 0	
612	132	If $f(x) = x^3 + ax + 1$ and $f(1) = 1$, then the value of $f(2)$ is (A) 1 (B) 3 (C) 5 (D) 7	(D)
612	133	If $f(x) = \frac{x-1}{x+1}$, then $f\left(-\frac{1}{x}\right)$ is equal to (A) $-x$ (B) $-1/x$ (C) $-f(x)$ (D) $-f\left(\frac{1}{x}\right)$	(D)
612	134	If $f(x) = \frac{x+2}{x-2}$, then $\mathrm{Lt}_{x\to\infty} f(x)$ is (A) 0 (B) 1 (C) 2 (D) does not exit	(B)
612	135	The function $f(x)$ has a minimum at a point $x = a$ if (A) $f'(a) = 0$ and $f''(a) = 0$ (B) $f'(a) = 0$ and $f''(a) < 0$	(C)

		(C) $f'(a) = 0$ and $f''(a) > 0$ (D) $f'(a) = 0$ and $f''(a) \le 0$	
612	136	The value of $\int_a^b 1/(1+x^2)\,dx$ is (A) $b^2 - a^2$ (B) $\sin^{-1}b - \sin^{-1}a$ (C) $\cos^{-1}b - \cos^{-1}a$ (D) $\tan^{-1}b - \tan^{-1}a$	(D)
612	137	The value of $\int_{-n}^{n} \mid a \mid da$ is (A) n^2 (B) $n^2 / 4$ (C) 0 (D) $-a^2$	(A)
612	138	$\int \frac{\log x}{x}$ is equal to (A) log (log$x$) (B) (log$x$)^2 (C) ½ (log$x$)^2 (D) ½ log(log)	(C)
612	139	The equation $y^2 - x^2 + 2x - 1 = 0$ represents (A) a pair of straight lines (B) a circle (C) an ellipse (D) a hyperbola	(A)
612	140		(A)

		The probability of Mr. A solving a problem is ¼ and Mr. B solving the same problem is ¾ . The probability that the problem is solved is (A) 1 (B) 1/2 (C) 3 /16 (D) 13 / 16	
612	141	In a Cricket test series of five tests, the captain of Indian team decides to call heads at every toss. The probability of his winning the toss in all the tests is (A) 2/25 (B) 2/5 (C) 1/2 (D) 1/32	(D)
612	142	A number of five digits is formed with digits 1, 2, 3, 4, 5 without repetition. The probability that it is a number divisible by 4 is (A) 1/5 (B) 2/5 (C) 3/5 (D) 4/5	(A)
612	143	A bag contains 7 red and 5 white balls. Four white balls are drawn at random. The probability that all of them are red, is (A) 7/99 (B) 14/33 (C) 14/99 (D) 12/ 35	(A)
612	144	A married couple appear for an interview for two vacancies in a company. The probability of man's selection is ¼ and that of woman's selection is 1/3. The probability that both of them will be selected is (A) 1/12 (B) 5/12	(A)

		(C) 1/2 (D) 7/12	
612	145	In the group $G=\{1,3,7,9\}$ under multiplication modulo10, the inverse of 3 is (A) 1 (B) 3 (C) 7 (D) 9	(C)
612	146	If G is a group and $a,b,c\in G$, then $(a\,b^{-1}\,c)^{-1}$ is (A) abc^{-1} (B) $c^{-1}a^{-1}$b (C) $a^{-1}bc$ (D) $c^{-1}ba^{-1}$	(D)
612	147	The number of improper subgroups of $G=\{1,-1,i,-i\}$ with respect to multiplication is (A) 2 (B) 1 (C) 3 (D) 4	(B)
612	148	The sub-group $H=\{(1),(1\,2)\}$ of S_3 is (A) an invariant subgroup of S_3 (B) a normal subgroup of S_3 (C) not a normal subgroup of S_3 (D) a normal divisor of S_3	(C)
612	149		(A)

		From 6 men and 4 women , the number of ways of forming a committee of 5 members, if there is no restriction on its formation, is (A) 252 (B) 240 (C) 236 (D) 180	
612	150	Let $a * b = a \times b - b$ ($a,b \in$ N and * is an operation on N). Then $a * b = b * a$ implies (A) $a = 0$ (B) $b = 0$ (C) $a = b$ (D) $a = -b$	(C)