MS-CIT
World-class Comprehensive Computer Course

Question Paper - I
Subject- Maths Std. – 12th

MKCL KLiC Courses
Gateway to Knowledge Lit Careers

Marks : 70 **Time : 3 Hrs**

Section A

Q.1 Select and write the correct answer. **16**

(i) If $p \vee q$ is true and $p \wedge q$ is false then which of the following is not true?

a) $p \vee q$ b) $p \leftrightarrow q$ c) $\sim p \vee \sim q$ d) $q \vee \sim q$

(ii) The principal solution of $tanx = \sqrt{3}$ is

a) $\frac{\pi}{6}, \frac{5\pi}{6}$ b) $\frac{\pi}{6}, \frac{7\pi}{6}$ c) $\frac{\pi}{3}, \frac{4\pi}{3}$ d) $\frac{\pi}{3}, \frac{2\pi}{3}$

(iii) The cosine of the angle between the planes $2x + 2y - 3z = 5$ *and* $x - 2y + 3z = 7$ is

a) $\frac{6}{\sqrt{238}}$ b) $\frac{11}{\sqrt{248}}$ c) $\frac{11}{\sqrt{238}}$ d) $\frac{12}{\sqrt{248}}$

(iv) The value of 'a' if the vectors $\bar{i} - 2\bar{j} + \bar{k}, a\bar{i} - 5\bar{j} + 3\bar{k}$ *and* $5\bar{i} - 9\bar{j} + 4\bar{k}$ are coplanar is

a) 1 b) 2 c) 3 d) 4

(v) If $y = \sqrt{logx + \sqrt{logx + \sqrt{logx + \cdots . \infty}}}$, then $\frac{dy}{dx} =$

a) $\frac{x}{2y-1}$ b) $\frac{x}{2y+1}$ c) $\frac{1}{x(2y-1)}$ d) $\frac{1}{x(1-2y)}$

(vi) The value of $\sqrt{16.1}$ is

a) 4.125 b) 4.25 c) 4.0125 d) 4.1

(vii) $\int_0^{\frac{\pi}{2}} xcosx\, dx =$

a) $\frac{\pi}{2}$ b) $\frac{\pi}{2} + 1$ c) $\frac{\pi}{2} - 1$ d) $\frac{\pi}{2} + 2$

(viii) The solution of the differential equation $e^{\frac{dy}{dx}} = x$ is

a) $y = xlogx + x + c$ b) $y = xlogx - x + c$

c) $y = \frac{1}{x} + c$ d) $y = x - xlogx + c$

Q.2 Answer the following. **4**

(i) Find the Polar co-ordinates of a point whose cartesian co-ordinates are $(-\sqrt{3}, 1)$

(ii) Find the joint equation of two lines passing through the origin and having slopes 2 and -3.

(iii) Find $\frac{dy}{dx}$ if $y = [acos^3x + bsin^3x]^3$

(iv) Find the Order and degree of the differential equation

$$\sqrt{\left(\frac{dy}{dx}\right)^3} = \left(\frac{d^2y}{dx^2}\right)^{\frac{1}{2}}$$

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Section B

Attempt any Eight. **16**

Q.3 Write the negations of (a) Some natural numbers are not integers.
(b) $\forall n \in N, n+1>2$

Q.4 Solve the equations using Reduction method:
$x+y+z=6; 3x-y+3z=10; 5x+5y-4z=3$

Q.5 Show that $\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{2}{11}\right)=\tan^{-1}\left(\frac{3}{4}\right)$

Q.6 Find 'k' if 2x + y = 0 is one of the lines given by $3x^2+kxy+2y^2=0$

Q.7 The Cartesian equation of a line is $3x+1=6y-2=1-z$.Find its vector equation.

Q.8 Find the general solution:$cos3x=\frac{1}{\sqrt{2}}$

Q.9 Find the values of 'x' if f(x) = $2x^3-15x^2-84x-7$ is a decreasing function.

Q.10 Evaluate: $\int \frac{dx}{1+3sin^2x}$

Q.11 For the following probability distribution of X

X	0	1	2	3	4
P(X=x)	2k	5k	4k	3k	2k

find (i)'k' (ii) $P(X \geq 2)$s

Q.12 Find the maximum volume of a right circular cylinder, if the sum of its radius and height is 6units.

Q.13 Form a differential equation by eliminating the arbitrary constants A and B: $y=Ae^{4x}+Be^{-4x}$

Q.14 A fair coin is tossed 6 times. Find the probability that it shows tail exactly 2 times.

Section C

Attempt any Eight. **24**

Q.15 In ΔABC, a = 4, b = 5, c = 3, find the value of (a) $sin\frac{A}{2}$ (b) cosA and (c) A(ΔABC)

Q.16 Show that the lines $x^2-4xy+y^2=0$ and x + y = 10 contain the sides of an equilateral triangle. Find the area of the triangle.

Q.17 Find the co-ordinates of the foot of the perpendicular drawn from the point (2,4, -1) on the line $\frac{x-1}{2}=\frac{y}{1}=\frac{z}{2}$.

Q.18 Prove using vector methods: "The medians of a triangle are concurrent".

Q.19 Find the direction ratios of a vector perpendicular to the two lines having direction ratios -2,1,-1 and -3,-4,1.

Q.20 Find the vector equation of a plane passing through the points $(2,3,1)$, $(4,-5,3)$ and parallel to X-axis.

Q.21 If $x=acos^3t, y=asin^3t, show\ that\ \frac{dy}{dx}=-\left(\frac{y}{x}\right)^{\frac{1}{3}}$

Q.22 Evaluate: $\int \frac{1}{3+2sinx+cosx}dx$

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Q.23 The slope of the tangent to the curve at any point is equal to $y + 2x$.Find the equation of the curve passing through the origin.

Q.24 A spherical snow ball is melting so that its volume is decreasing at the rate of 8cc/sec.Find the rate at which its radius is decreasing when it is 2cm.Also find the rate of change of surface area at that time.

Q.25 Let X~ B (n, p)

(i) If n = 15, E(X) = 5, find 'p' and Var(X)

(ii) If E(X) = 9, Var(x) = 4.5 find n and p.

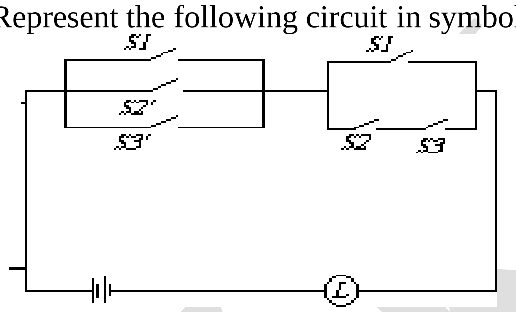
Q.26 Obtain the expected value and Variance of X for the following probability distribution.

X = x	0	1	2	3	4
P(X = x)	0.2	0.1	0.2	0.4	0.1

Section D

Attempt any five. **20**

Q.27 Represent the following circuit in symbolic form and construct its input output table.



Q.28 Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 5 \\ 2 & 4 & 7 \end{bmatrix}$ using Adjoint method.

Q.29 If $\bar{a}, \bar{b}, \bar{c}$ are the position vectors of the points A, B,C w.r.t.origin and point C divides AB internally in the ratio of m:n,then prove that $\bar{c} = \frac{m\bar{b}+n\bar{a}}{m+n}$.Hence find the position vector of the point C which divides AB,A(2,-1,3) and B(-5,2,-5) internally in the ratio of 3:2

Q.30 Minimize z = 30x + 20y subject to $x + y \leq 8, x + 4y \geq 12, 5x + 8y \geq 20, x, y \geq 0$

Q.31 Prove: If y = f(u) is a differentiable function of u and u = g(x) is a differentiable function x then y = f[g(x)] is a differentiable function of x and $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$. Also, find $\frac{dy}{dx}$ if $y = sin^2(x + 3)$

Q.32 Evaluate: $\int e^{3x} sin2x \, dx$

Q.33 Prove: $\int_{-a}^{a} f(x)dx = 0$ if f is odd

$= 2\int_0^a f(x)dx$ if f is $even.$

Q.34 Find the area of the region in the first quadrant bounded by the circle $x^2 + y^2 = 4$,X-axis and the line $x = y\sqrt{3}$.