MATHS

BOOKS - GURUKUL BOOKS & PACKAGING

MATHS (HINGLISH)

MARCH 2019

Section A

1. Find the principal solution of $\cot x = -\sqrt{3}$

A. $\frac{\pi}{6}, \frac{5\pi}{6}$

B. $\frac{5\pi}{6}, \frac{7\pi}{6}$

C. $\frac{5\pi}{6}, \frac{11\pi}{6}$

D. $\frac{\pi}{6}, \frac{11\pi}{6}$

Answer: C

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2. The acute angle between the two planes $x + y + 2z$ = 3 and 3x - 2y + 2z = 7 ` is .....

A. $\sin^{-1}\left(\frac{5}{\sqrt{102}}\right)$

B. $\cos^{-1}\left(\frac{5}{\sqrt{102}}\right)$

C. $\sin^{-1}\left(\frac{15}{\sqrt{102}}\right)$

D. $\cos^{-1}\left(\frac{15}{\sqrt{102}}\right)$

Answer: b

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3. Direction ratios of the line which is perpendicular to the lines with direction ratios (-1,2,2) and (0,2,1) are

A. $-2, -1, -2$

B. $2, 1, 2$

C. $2, -1, -2$

D. $-2, 1, -2$

Answer:

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4. If $f(x) = (1 + 2x)^{1/x}$, f or $x \neq 0$ is continous at x = 0 , then f(0) = ...

A. e

B. e^2

C. 0

D. 2

Answer: B

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5. $\int \frac{dx}{9x^2+1}$

A. $\frac{1}{3}\tan^{-1}(2x)+c$

B. $\frac{1}{3}\tan^{-1}x+c$

C. $\frac{1}{3}\tan^{-1}(3x)+c$

D. $\frac{1}{3}\tan^{-1}(6x)+c$

Answer: C

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6. If $y = ae^{5x} + be^{-5x}$, then the differential equation is .....

A. $\frac{d^2y}{dx^2} = 25y$

B. $\frac{d^2y}{dx^2} = -25y$

C. $\frac{d^2y}{dx^2} = -5y$

D. $\frac{d^2y}{dx^2} = 5y$

Answer: A

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Section B

1. Write the truth values of the following statement

2 is a rational number and $\sqrt{2}$ is an

irrational number.

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2. Write the truth values of the following statement

$2+3=5$ or $\sqrt{2}+\sqrt{3}=\sqrt{5}$

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3. Find the volume of the parallelopiped, if the

coterminus edges are given by the vectors

$2\hat{i}+5\hat{j}-4\hat{k}.\ 5\hat{i}+7\hat{j}+5\hat{k}, 4\hat{i}+5\hat{j}-2\hat{k}$

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4. Find the value of p, if the vectors $\hat{i} - 2\hat{j} + \hat{k}$, $2\hat{i} - 5\hat{j} + p\hat{k}$ and $5\hat{i} - 9\hat{j} + 4\hat{k}$ are coplanar .

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5. Show the equation of the points A (-7 , 4, - 2) , B (-2, 1,0) and

C (3, -2, 2) are collinear .

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6. Write the equation of the plane $3x + 4y - 2z = 5$ in

the vector form .

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7. If $y = x^x$, find $\frac{dy}{dx}$ at $x = e$.

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8. The equation of tangent to the curve $y = x^2 + 4x + 1$ at (-1, -2) is

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9. Evaluate: $\int \frac{(x+1)e^x}{\cos^2(xe^x)}dx$

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10. Evaluate : $\int_0^{\frac{\pi}{2}} \sin^2 x dx.$

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Section C

1. In ΔABC , prove that :

$$\sin\left(\frac{B-C}{3}\right)=\left(\frac{b-c}{a}\right)\cos\left(\frac{A}{2}\right)$$

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2. Show that $\sin^{-1},\frac{5}{13}+\cos^{-1},\frac{3}{5}=\tan^{-1},\frac{63}{16}.$

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3. If $A(\bar{a})$ and $B(\bar{b})$ are any two points in the space and $R(\bar{r})$ be a point on the line segment AB dividing it internally in the ratio m : n , then prove that

:

$$\bar{r} = \frac{m\bar{b} + n\bar{a}}{m+n}$$

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4. The equation of line is $2x - 2 = 3y + 1 = 6z - 2$ find its direction ratios and also find the vector equation of the line .

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5. Discuss the continunity of the funcation

$$f(x) = \frac{\log(2+x) - (\log(2-x))}{\tan x} \text{for x} \quad \neq 0$$

= 1 for x = 0

at the point x= 0

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6. The probablity distribution of a random variable X , the number of defects per 10 meters of a fabric is given by

x	0	1	2	3	4
$P(X = x)$	0·45	0·35	0·15	0·03	0·02

Find the variance of X .

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7. For the following probability density function (p.d.f) of X find : (i) P $(X < 1), (ii) p(|X| < 1)$ if $f(x) = \frac{x^2}{18'} - 3 < x < 3$, f(x) = 0 , otherwise

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8. Given $X \sim B(n, p)$ if E(X) = 6, Var (X) = 4.2 , find the value of n and p.

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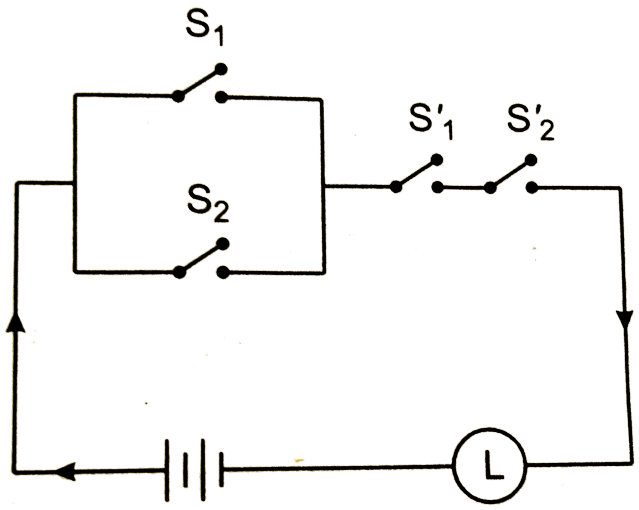
Section D

1. Find the symbolic form of the given switching circuit . Construct its switching table and interpret your result .



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2. If three numbers are added , their sum is 2 . If two times the second number is subtracted from the sum

of first and third numbers we get 8 and if three times the first number added to the sum of second and third numbers we get 4 . Find the numbers using matrices .

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3. In ΔABC , with usual notations prove that :

$b^2 = c^2 + a^2 - 2ca\cos B.$

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4. In $\Delta ABC,$ prove that

$(a-b)^2 \cos^2.\frac{C}{2} + (a+b)^2 \sin^2.\frac{C}{2} = c^2$

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5. Find P and k if the equation

$px^2 - 8xy + 3y^2 + 14x + 2y + k = 0$

represents a pair of perpendicular lines.

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6. Maximize $z = 3x + 5y$ subject to

$x + 4y \leq 24$ $3x + y \leq 21,$

$x + y \leq 9$ $x \geq 0, \ y \geq 0$

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7. If $x = f(t), y = g(t)$ are differentiable functions of parameter 't' then prove that y is a differentiable function of 'x' and

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}, \frac{dx}{dt} \neq 0$$

Hence find $\frac{dy}{dx}$ if $x = a\cos t, y = a\sin t.$

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8.

$f(x) = (x-1)(x-2)(x-3), x \in [0, 4]$ find $'c'$ if LMVT can be applied .

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9. A rod of 108 meters long is bent to from a rectangle . Find its dimensions if the area is maximum .

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10. $\int \frac{1}{\sqrt{a^2+x^2}} dx = \log\left(x + \sqrt{x^2+a^2}\right) + c$

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11. Evaluate $\int_0^{\frac{\pi}{4}} \log(1+\tan x) dx$

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12. The integrating factor of linear differential equation $\frac{dy}{dx} + y \sec x = \tan x$ is

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13. Solve the differential equation :

$(x + y)\frac{dy}{dx} = 1$.

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