

FIRST TERMINAL EXAMINATION [2022-23]

Class : XII [Science]

Subject: Mathematics & Statistics

Time: 2.30 Hr.

Marks:50

Section A

Q.1: Select and write the most appropriate answer from the given alternatives in each of the following.

[10m]

i] If $\log_{10} \sin x, \frac{dy}{dx}$ is

- a) $\cot x$ b) $\cot x \log_{10} e$ c) $\tan x$ d) $\log_{10} \cos x$

ii] The approximate surface area of a sphere of radius 3.02 cm is

- a) 36 cm^2 b) $36.48\pi \text{ cm}^2$ c) $30\pi \text{ cm}^2$ d) $40\pi \text{ cm}^2$

iii] $\int_1^2 \frac{1}{x^2} e^{\frac{1}{x}} dx = \dots\dots\dots$

- a) $\sqrt{e} + 1$ b) $\sqrt{e} - 1$ c) $\sqrt{e}(\sqrt{e} - 1)$ d) $\frac{\sqrt{e}-1}{e}$

iv] In ΔABC , $2 \left\{ a \sin^2 \frac{C}{2} + c \sin^2 \frac{A}{2} \right\} =$

- a) $a+b-c$ b) $b+c-a$ c) $a+c-b$ d) $a-c-b$

v] If the acute angle between the lines $3x^2 + 2hxy + 2y^2 = 0$ is 45° then the value of h is

- a) ± 7 b) $\pm \frac{7}{2}$ c) ± 2 d) 2

Q.2: Answer the following.

[4m]

1) Determine the nature of the lines represented by equation: $x^2 - y^2 = 0$

2) Find the general solution of the following equation

$$\tan^2 \theta = 3$$

3) Differentiate the following w. r. t. x

$$\tan^{-1}(\log x)$$

4) Integrate the following w. r. t. x

$$\int x^2 \left(1 - \frac{2}{x}\right)^2 dx$$

Section B

Attempt any eight of the following:

[16M]

Q.3: Without using truth table prove that

$$\sim(p \vee q) \vee (\sim p \wedge q)$$

Q.4: Find the derivative of the inverse of function

$$Y = e^x + 3x + 2$$

and calculate its value at $x=0$.

Q.5: Find the matrix X such that $AX = I$ where $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Q.6: Evaluate : $\int_0^{\pi/2} \sin 4x \sin 3x dx$

Q.7: $\int \frac{\log(\log x)}{x} dx$

Q.8: Differentiate: $e^{\tan x} + (\log x)^{\tan x}$

Q.9: Find the value of K if lines represented by $kx^2 + 4xy - 4y^2 = 0$ are

Perpendicular to each other.

Q.10: Write the converse and inverse of the following statement.

‘If r is a rational number , then r is a real number.’

Q.11: Find Principal solution of :

$$\sqrt{3} \operatorname{cosec} \theta + 2 = 0$$

Q.12: If $\int_0^\alpha (3x^2 + 2x + 1)dx$ then find α

Q.13: Find the combined equation of :

Pair of lines passing through (2,3) and parallel to the coordinate axes.

Section C

Attempt any four of the following:

[12M]

Q.14: $\int \frac{1}{\sqrt{\sin^3 x \sin(x+2)}} dx$

Q.15: Differentiate

$\tan^{-1} \left[\frac{\sqrt{1+x^2}+x}{\sqrt{1+x^2}-x} \right]$ w.r.t.x

Q.16: Find the joint equation of the pair of lines passing through the origin

which are perpendicular respectively to the lines represented by

$$5x^2 + 2xy - 3y^2 = 0$$

Q.17: If u and v are two function of x then prove that

$$\int uv dx = u \int v dx - \int \left[\frac{du}{dx} \int v dx \right]$$

Hence evaluate.

Q.18: Solve the following equations by method of inversion

$$X + 2y = 2, 2x + 3y = 3$$

Q.19: Determine whether each of the following statement pattern is a tautology

or a contradiction or contingency.

$$(p \wedge q) \vee (p \wedge r)$$

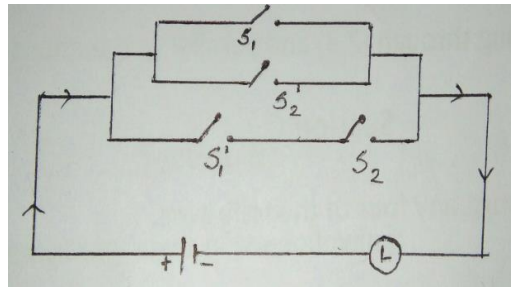
Section D

Attempt any Two of the following:

[8M]

Q.20: Find the symbolic form of the given switching circuit . Construct its

Switching table and interpret your result.



Q.21: Find the inverse of the matrix

$$A = \begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$$

Using elementary row transformation.

Q.22: In any ΔABC , prove that

$$\frac{b - c}{a} = \frac{\tan \frac{B}{2} - \tan \frac{C}{2}}{\tan \frac{B}{2} + \tan \frac{C}{2}}$$

Q.23: Prove that

$$\int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx \quad \text{if } f(x) \text{ is an even function.}$$

$$= 0 \quad \text{if } f(x) \text{ is an odd function.}$$