MATHEMATICS 2021

(AS PER CONDENSED SYLLABUS)

TIME: 2 Hours **(100 Marks)**

NOTE:

i) This section consists of 25 part questions and all are to be answered. Each question carries 02 marks.

ii) Do not copy the part questions in your answer book. Write only the answer in full against the proper number of the question and its part.

iii) The use of calculator is allowed. All notations are used in their usual meanings.

SECTION 'A' (Multiple Choice Questions)(50)

1. Choose the correct answer for each from the given options:

i) The $\lim_{x\to 0}\frac{e^{2x}-1}{x}=$ * 0 * 3✓ * 2 * 1

ii) $\lim_{x\to 0}\frac{\sin\left(\frac{4}{5}x\right)}{x}=$ * $\frac{5}{4}$ * ✓$\frac{4}{5}$ * $\frac{1}{4}$ * $\frac{1}{5}$

iii) $\lim_{y\to\infty}\left(1+\frac{5}{y}\right)^y=$ * e^5✓ * e^4 * e * 5

iv) The perpendicular form of the equation of a straight line is:
* $y=mx+c$ * $y-y_1=m(x-x_1)$
* $\frac{x}{a}+\frac{y}{b}=1$ * $x\cos\alpha+y\sin\alpha=p$✓

v) Distance of the point (4,5) from y → axis is:
* 5 units * 9 units * 4 units✓ *1 unit

vi) The distance between two points $(\mu\cos\theta,\mu\sin\theta)$ and (0, 0) is:
* 1 units * μunits✓ * μ^2units * −1 unit

vii) The slope of the line perpendicular to $3x-5y-15=0$ is:
* $\frac{5}{3}$ * $-\frac{5}{3}$✓ * $-\frac{3}{5}$ * $\frac{3}{5}$

viii) The slope of the tangent to the curve $y=x^2+4$ at $x=1$ is:
* 0 * 1 * 2✓ * 4

ix) If two lines are perpendicular, then:
* $a_1a_2+b_1b_2=1$ * $a_1b_2+a_2b_1=0$
* $a_1a_2+b_1b_2=0$✓ * $a_1a_2+b_1b_2=-1$

x) $\frac{d}{dx}(x^a)=$:
* $x^a\ln a$ * $\frac{x^a}{\ln a}$ * $x^a\ln x$ * ax^{a-1}✓

xi) $\frac{d}{dx}\sec^2 x=$
* $\sec^2x$ * $\sec^2x\tan x$ * $\tan x$ * $2\sec^2x\tan x$✓

xii) If $x=p\sin t$ and $y=q\cos t$, then $\frac{dy}{dx}=$
* $-\tan t$ * $\frac{q}{p}\cos t$ * ✓$\frac{-q}{p}\tan t$ * $\frac{-q}{p}\tan t$

xiii) If $n=-1$, then $\int\{f(x)\}^n f'(x)dx$:
* $\frac{\{f(x)\}^{n+1}}{n+1}+c$ * $\frac{\{f(x)\}^{n+1}}{n}+c$
* $\ln f(x)+c$✓ * $\frac{\{f(x)\}^{n-1}}{n-1}+c$

xiv) The necessary condition for f(x) to have an extreme value is:
* $f'(x)=1$ * $f(x)=0$✓ * $f'(x)=0$ * $f''(x)=0$

xv) $\int\frac{dx}{3+x^2}=$:
* $\tan^{-1}\frac{x}{3}+c$ * $\sin^{-1}\frac{x}{\sqrt{3}}+c$
* $\frac{1}{\sqrt{3}}\tan^{-1}\frac{x}{\sqrt{3}}+c$✓ * $\cos^{-1}\frac{x}{\sqrt{3}}+c$

xvi) $\int e^{x^2}2xdx$ is equal to :
* $2x+c$ * $e^{2x}+c$ * $e^{x^2}+c$✓ * x^2+c

xvii) $\int\frac{(1+x)dx}{x^2+2x}=$:
* $\ln(x^2+2x)+c$ * $\ln\sqrt{x^2+2x}+c$✓
* $\ln(x^2+2x)^2+c$ * $\ln(2x+1)+c$

xviii) This equation of circle passes through the origin:
* $x^2+y^2+8x+7=0$ * $x^2+y^2-9y+11=0$
* $x^2+y^2+8x+11y=0$✓ * $x^2+y^2-8x+11y+19=0$

xix) The center of the circle $x^2+y^2+6x-10y+33=0$ is:
* (-3, 5) * (-3, -5) * (3, -5) * (3, 5)

xx) The radius of the circle $x^2+y^2+2gx+2fy+k=0$ is:
* $\sqrt{g^2+f^2+k}$ * $\sqrt{g^2+f^2-k}$✓
* $\sqrt{g^2-f^2+k}$ * $\sqrt{f^2-g^2+k}$

xxi) In the parabola $y^2=4ax$, $|4a|$ represents:
* focus * vertex * axis * length of latus rectum✓

xxii) The length of minor axis of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$:
* 25 * 4 * 6✓ * 8

xxiii) The vertices of hyperbola $\frac{x^2}{16}+\frac{y^2}{4}=1$ are :
* $(\pm2,0)$ * $(0,\pm2)$ * $(0,\pm4)$ * $(\pm4,0)$✓

xxiv) Magnitude of the vector $a=3\hat{i}-\hat{j}+2\hat{k}$ is :
* 13 * $\sqrt{12}$ * $\sqrt{14}$✓ * $\sqrt{11}$

xxv) The unit vector in the direction of $\bar{r}=\hat{i}+\hat{j}+\hat{k}$ is :
* 1 * $\sqrt{3}(\hat{i}+\hat{j}+\hat{k})$
* $\frac{1}{\sqrt{3}}(\hat{i}+\hat{j}+\hat{k})$✓ * $\frac{1}{\sqrt{3}}(\hat{i}-\hat{j}+\hat{k})$