

II/SEM/COMMON/2019(W)/(NEW)

Th. 3-ENGINEERING MATHEMATICS-II

Full Marks: 80

Time : 3 Hours

Answer any Five Questions including Q No. 1& 2

Figures in the right hand margin indicates marks

<p>No.1</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>d)</p> <p>e)</p> <p>f)</p> <p>g)</p> <p>h)</p> <p>i)</p> <p>j)</p>	<p>Answer ALL the Questions:</p> <p>Evaluate $\lim_{x \rightarrow 0} \frac{\sin px}{\sin qx}$</p> <p>Evaluate $\lim_{n \rightarrow \infty} \frac{\sqrt{n} - 1}{\sqrt{n} + 1}$</p> <p>Find the derivative of $\sqrt{ax^2 + bx + c}$ with respect to x, where a, b, c are constants.</p> <p>Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = \cos^{-1}\left(\frac{x}{y}\right)$</p> <p>Integrate $\int \sqrt{1 + \cos 2x} \, dx$</p> <p>Integrate $\int \frac{\sec^2 x}{1 + \tan x} \, dx$</p> <p>Find order and degree of the differential equation</p> $3 \frac{d^2 y}{dx^2} = \left\{ 2 + \left(\frac{dy}{dx} \right)^2 \right\}^{\frac{5}{3}}$ <p>Find the unit vector in the direction of the vector $3\hat{i} + \hat{j} + \hat{k}$</p> <p>Solve $\frac{dy}{dx} = (x^2 + 1)(y^2 + 1)$</p> <p>Find slope of the curve $y = \log x$ at $x = 1$</p>	<p>2 X 10</p>
<p>No.2</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>d)</p>	<p>Answer any SIX Questions:</p> <p>Evaluate $\lim_{x \rightarrow 1} \frac{2^{x-1} - 1}{\sqrt{x} - 1}$</p> <p>Test the continuity of the function $f(x) = \begin{cases} (1 + 2x)^{\frac{1}{x}}, & \text{if } x \neq 0 \\ e^2, & \text{if } x = 0 \end{cases}$ at $x = 0$</p> <p>Differentiate $5^{\cos x^2}$ with respect to x</p> <p>Find $\frac{dy}{dx}$ if $x = 2 \cos^3 t$ and $y = 2 \sin^3 t$</p>	<p>5x6</p>

e)	Prove that $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \frac{x}{a} + c$, Where c is integrating constant.	
f)	Solve $\frac{dy}{dz} = \frac{\sqrt{1-y^2}}{\sqrt{1-z^2}}$	
g)	Find Scalar and Vector Projection of \vec{a} on \vec{b} , Where $\vec{a} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{b} = 2\hat{i} + 2\hat{j} + \hat{k}$	
No3	Integrate $\int e^{3x} \cos 2x dx$	10
No4	Differentiate $(\log x)^{\tan x}$	5
a)	If $y = \sin(\sin x)$ prove that	5
b)	$\frac{d^2 y}{dx^2} + \tan x \frac{dy}{dx} + y \cos^2 x = 0$	
No.5	Integrate $\int e^{\cos^2 x} \sin 2x dx$	5
a)		
b)	Determine the area of parallelogram, whose adjacent sides are the vector $2\hat{i} + \hat{j} - \hat{k}$ and $3\hat{i} + \hat{j} - \hat{k}$	5
No.6	Find the value of $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$	5
a)		
b)	Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos^3 x}{x \sin 2x}$	5
No7	Solve $\frac{dy}{dx} + y \tan x = \sec x$	10