ANNUAL EXAMINATION 2020

(Only for Regular Students)

Centre No. 135	***Centre Name- Disha College, Raipur (C.G.)***
Class-B.Sc.-I	**Subject- Mathematics**
Paper No-II	**Paper Name- Calculus**
Time- 3 hrs.	**M.M.-50**

Note – *Attempt all units. Solve any two from each units. Each question carries equal marks.*

Unit-I

Q1(a) **Vsyj&izes; ls** $\tan^{-1}x$ **dk** $\left(x-\frac{\pi}{4}\right)$ **dh ?kkrks es izlkj Kkr dhft,A%**

Expland $\tan^{-1}x$ is powers of $\left(x-\frac{\pi}{4}\right)$ by Taylors's theorem.

(b) **;fn** $f(x)=\begin{cases}\frac{x^2-1}{x+1}, & x\neq -1\\ -2, & x=-1\end{cases}$

Rkks D;k f(x), x = -1 **ij lrr g**

If $f(x)=\begin{cases}\frac{x^2-1}{x+1}, & x\neq -1\\ -2, & x=-1\end{cases}$

Then decide whether the function f(x) is continuous at x = -1

(c) $\varepsilon-\delta$ **fof/k dk ç;ksx ls fl) dhft;s fd** $\lim_{x\to 5}\frac{1}{x}=\frac{1}{5}$

Apply $\varepsilon-\delta$ technique to prove that $\lim_{x\to 5}\frac{1}{x}=\frac{1}{5}$

Unit-II

Q2(a) **oØ** $x^3+2x^2y-xy^2-2y^3+xy-y^2-1=0$ **dh vuUrLif'kZ;k Kkr dhft,A**

Find all asymptotes of the curve.

$x^3+2x^2y-xy^2-2y^3+xy-y^2-1=0$

(b) **oØ** $y^2(a+x)=x^2(a-x), a>0$ **dk vujs[k.k dhft,A**

Trace the curve.

$y^2(a+x)=x^2(a-x), a>0$

(c) **fl) dhft, fd oØ** $x^{2/3}+y^{2/3}=a^{2/3}$ **ds fcUnq** $(a\cos^3\theta, a\sin^3\theta)$ **ij oØrk&f=T;k** $3a\sin\theta\cos\theta$ **gSA**

Prove the radius of curvature of the curve $x^{2/3}+y^{2/3}=a^{2/3}$ at the point $(a\cos^3\theta, a\sin^3\theta)$ is $3a\sin\theta\cos\theta$

Unit-III

Q3(a) **oØks** $y^2=4-x$ **vkSj** $y^2=x$ **ls ifjc) {ks= dk {ks=Qy Kkr dhft,A**

Find the area enclosed by the curves.

$y^2=4-x$ and $y^2=x$

(b) **fl) dhft,A** $\int_0^{\pi}\frac{x\,dx}{a^2Cos^2x+b^2Sin^2x}=\frac{\pi^2}{2ab}$

Prove that: $\int_0^{\pi}\frac{x\,dx}{a^2\cos^2x+b^2\sin^2x}=\frac{\pi^2}{2ab}$

(c) $\int\left(\sqrt{\tan x}+\sqrt{\cot x}\right)dx$ **dk eku Kkr dhft,A**

Evaluate $\int\left(\sqrt{\tan x}+\sqrt{\cot x}\right)dx$

Unit-IV

Q4(a) gy dhft ,A $x\frac{dy}{dx} + y = y^2 logx$

Solve: $x\frac{dy}{dx} + y = y^2 logx$

(b) gy dhft , (1+xy) y dx + (1-xy)x dy = 0

Solve the differential equation : (1+xy) y dx + (1-xy)x dy = 0

(c) gy dhft , $\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 9y = 40\, sin5x$

Solve. $\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 9y = 40\, sin5x$

Unit-V

Q5(a) Lor= pj dk ifjHkf"kr djds fuEukfdr vody lehdj.k dk gy dhft ,A

$$\frac{d^2y}{dx^2} + cotx\frac{dy}{dx} + 4y\, cosec^2x = 0$$

Transform independent variable x into z and solve the following differential equation.

$$\frac{d^2y}{dx^2} + cotx\frac{dy}{dx} + 4y\, cosec^2x = 0$$

(b) çkpy fopj.k fof/k ls gy dhft ,A $\frac{d^2y}{dx^2} + a^2y = \sec ax$

Solve by method of variation of parameter. $\frac{d^2y}{dx^2} + a^2y = \sec ax$

(c) gy dhft , $\frac{dx}{dt} + 4x + 3y = t,\ \frac{dy}{dt} + 2x + 5y = e^t$

Solve the following simultaneous differential equations.

$\frac{dx}{dt} + 4x + 3y = t,\ \frac{dy}{dt} + 2x + 5y = e^t$

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