P.S.SCIENCE & H.D.PATEL ARTS COLLEGE, KADI

INTERNAL EXAMINATION

	B.Sc. Sem -IV	Marks 40
06/03/2018	Mathematics	Time: 1.45 to 3.45
	CC-MATH- 401	

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1. (A) Attempt any one.

   (i) Obtain the formula for radius of curvature of the curve $r = f(\theta)$.

   (ii) Prove the relation $\beta(m,n) = \dfrac{\overline{)m}\,\overline{)n}}{\overline{)m+n}}$.

   (B) Attempt any two.

   (i) Find the radius of curvature of the curve $r = a(1 - \cos\theta)$

   (ii) Evaluate $\int_0^1 \sqrt{x}\sqrt[3]{(1-x^2}\,dx$ and $\int_{-\infty}^{\infty} e^{-a^2x^2}dx$

   (iii) Find the radius of curvature of the curve $x^{2/3} + y^{2/3} = a^{2/3}$

2. (A) Attempt any one.

   (i) Change the order of integration $\int_0^3 \int_{4y/3}^{\sqrt{25-y^2}} f(x,y)dy.dx$.

   (ii) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} \left(x^2+y^2\right)dx\,dy$ by transforming into polar co-ordinate.

   (B) Attempt any two.

   (i) Find the volume of $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$.

   (ii) Find $\iint\left(x^2+y^2\right)dx\,dy$ over the region bounded by

$x=1, x=2, y=1, y=x^2$

(iii) $\iiint_V x^2 \, dx \, dy \, dz$, where V is enclose by the planes

$x=0, y=0, z=0$ and $x+y+z=a$

3. (A) Attempt any one

(i) Prove that

$div.(\varphi f)=\varphi \ div.f + f \ (grad \ \varphi)$

(ii) State and prove Green's Theorem.

(B) Attempt any two.

(i)Verify Green's theorem

$\oint_c \left(3x^2-8y^2\right)dx+\left(4y-6xy\right)dy$, where c is the

boundary of region bounded by $y^2=x$ and $x^2=y$.

(ii) If $f=\left(2yz,-x^2y,xz^2\right)$ and $\phi(x,y,z)=2x^2yz^3$ then

$(f.\nabla)\phi=f.(\nabla\phi)$.

(iii) Evaluate $\iint_s f.n \, ds$, where $f=\left(x+y^2,-2x,2yz\right)$ and

surface s is the plane $2x+y+2z=6$ in the first octant.