B.Sc. EXAMINATION: APRIL - 2016

SEMESTER-IV

DIFFERENTIAL & INTEGRAL CALCULUS

PAPER NO.:M-401 CODE NO:3836

TIME:2 :30HOURS TOTAL MARKS:70

INSTRUCTIONS(1)ALL QUESTIONS ARE COMPULSORY.
(2)EACH QUESTION CARRY EQUAL MARKS.

Q.1 A Find P.D.E of $f\left(\frac{xy}{z}, \frac{yz}{x}\right)=0$ [7]

B Find general solution of the P.D.E : $(z^2 - 2yz - y^2)p + x(y+z)q = x(y-z)$ [7]

OR

Q.1 A Find P.D.E of $(1 + b^3)z = 8\,(x + by + a)^3$ [7]

B Find general solution of the P.D.E : $x^4(y - z)p + y^4(z - x)q = z^4(x - y)$. [7]

Q.2 A Obtain formula of radius of curvature of curve :x=f(t) ,y=g(t) [7]

B Find radius of curvature of $x^2y + xy^2 + xy + y^2 - 3x = 0$ at origin [7]

OR

Q.2 A Find radius of curvature of $x^2 + 5xy + 8y^2 - 40x = 0$ at origin [7]

B Obtain formula of radius of curvature of curve : y=f(x) [7]

Q.3 A Find equation of tangent plane and normal line to the surface :
$5x^2 + 6y^2 + 7z^2 = 100$ at (8,9,10) [7]

B Prove :div(curl f)=0 for $f=(x^3yz, xy^3z, xyz^3)$ [7]

OR

Q.3 A Find equation of tangent line and normal plane to the curve :
$x^2 - y^2 - 4z^2 = 49$, $x + 3y + 8z = 9$ at point (2,3,2) [7]

B Prove :div($f \times g$) = g.curlf –f. curlg. for $f = (f_1,f_2,f_3)$ and $g = (g_1, g_2, g_3)$. [7]

Q.4 A Evaluate : $\int_1^3 \int_1^2 x^2y(x + y)\,dxdy$ [7]

B Evaluate : $\int_0^{-\frac{\pi}{2}} \int_{-1}^{1} (x\sin y - ye^x)\,dydx$ [7]

OR

Q.4 A Evaluate : $\int_0^9 \int_0^{\sqrt{36-y^2}} (xy)\,dxdy$ [7]

B Evaluate : $\iint_s (x^2 + y^2)\,dxdy$ Where $s = [0,1] \times [x, \sqrt{x}]$. [7]

Q.5 A Evaluate $\int x\,dy - y\,dx$ over circle x = cost, y=1- sint, $(-\frac{\pi}{2} \le t \le 0)$,
From (0,0) to (2,2) [7]

B Verify Stoke's theorem for $(-y^2, x^2, 0)$,
where C is the circle : $x^2 + y^2 = 16$, Z = 0 [7]

OR

Q.5 A Let $f = (f_1,f_2,f_3)$ be continuous vector function in R.the line integral
$\int f \cdot dr$ is independent of path C joining points P & Q $\Leftrightarrow \oint_c f \cdot dr$ [7]

B Evaluate: $\iiint_s xyz\,dxdydz$ Where $s = [0,1]\times[0,2]\times[0,3]$. [7]