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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2017
(First Semester)

Branch- MATHEMATICS

CALCULUS

Time : Three Hours Maximum : 75 Marks

SECTIQN-A (20 Marks)

Answer ALL questions
ALL questions carry EQUAL marks (10x2 = 20)

If u = $x^z + y^z + z^2$, x = e^l, y = e^l sint, z = e^lcos t. Find —.
. dt

State the necessary conditions for the existence of maxima or a minima of f(x,y).
Write down the formula for finding the radius of curvature in Cartesian form.
Define evolute and involute of a curve.
State any two properties of definite integrals.
State Bemoullis formula.

1 2 .
Evaluate f f(x^2+y^2)dydx.
00

7C/
/2 a
8 Evaluate J jdrdO.
0'0

9 Find the value of fx^7(l-x)^{8}dx.
0

10 Show that p(m,n) = p(n,m).

SECTION - B (25 Marks)

Answer ALL Questions
ALL Questions Carry EQUAL Marks (5x5 = 25)

11 a Find the maximum or minimum values of 2(x^2 -.y^2)-x^4+y^4.

OR

b If z = f(x, y), x = r cos0, y = r sin0, show that

2
*'dz \\$^2$ dz >^{2} —^{2} dz} 1 (dz^*
\+
\dxj dr +7 *{dQj*

12 a Prove that the radius of curvature at the point (a cos 0^3,asin $0)^3$ on the

2/ • 2/ 2/ ‘
curve x^3 + y^3 = a';3 is 3asin 0cos0.

OR

b Find the envelope of the ellipse $\frac{X^2}{a^2} + \frac{y^2}{b^2}$ = 1.

13 a Evaluate {sec^{11} xdx

OR

b Evaluate |x^4(logx)^{3}dx

Cont...

oooo$_e$—y
Evaluate jj------- dxdy.
ox y

0R '

•.

7V 7V
/ 2 / 2
j Jsin(x + y)dxdy.
0 0.. •’

Derive the recurrence formula of Gamma functions.

OR

Evaluate Je dx^2x.
0

SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Cany EQUAL Marks (3 x 10 = 30)

Find the shortest and longest distance from the point (1, 2, -1) to the sphere $x^2 + y^2 + z^2 = 24$.

Find the radius of curvature of the cardiod r = a(l-cos0)

VA
Prove that J log(l + tan 0)d0 = ^ log 2\
0 " ' •

it/ * 2 2
/2acosOVa -x^L
Evaluate j j J dzdrd0.
- 0 0 0

Evaluate JJx^{m}y^{n}dxdy over the positive quadrant of the circle

$x^2 + y^2 = a^2$ interms of Gamma functions, hence deduce area of the circle.