18PHU03

PSG COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2018

(First Semester)

Branch - PHYSICS

MATHEMATICS -1

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 If the coefficients have all like signs in f(x)=0, then_____ is a root.
(i) -1 (ii)+l (iii)+2 (iv) -2

2 When the degree is_____ , one of its roots must be its own reciprocal.
(i) like sign (ii) unlike sign (iii) odd (iv) even

3 The radius of the curvature is_____ to the length of the normal.
(i) Directly Proportional (ii) Inversely Proportional
(iii) Unequal (iv) Equal

4 The curvature of the circle is_____of its radius.
(i) Reciprocal (ii) Equal (iii) Inverse (iv) None

5 $\int_{-a}^{a} f(x)dx = 2\int_{0}^{a} f(x)dx$ then f(x) is said to be_____
(i) odd (ii) even (iii) constant (iv) none

6 $\int \sec^2 x\,dx =$
(i) secxtanx+c (ii) cotx+c (iii) tanx+c (iv) logsecx+c

7 Which is the equation of the sphere?
(i) $x^2+y^2=a^2$ (ii) $x^2+y^2+z^2>a2$ (iii) $x^2+y^2+c^2=r^2$ (iv) None

8 $\int_0^a \int_0^b \int_0^c xyz\,dx\,dy\,dz =$
(i) $\frac{abc}{8}$ (ii) $\frac{abc}{T}$ (iii) $\frac{(abc)^2}{2}$ (iv) $\frac{(abc)^2}{\sim 8\sim}$

9 The coefficient of $\cos^n 9$ in the expansion of cos $n0=nc_o+nc_2+nc_4+\ldots$.=
(i) 2"'1 (ii) 2^n-l (iii) 2n-l (iv) 2n

10 The expansion of $(n + j/)^n$ is grouped into pairs if n is
(i) even (ii) odd (iii)<l (iv) >1

SECTION - B (25 Marks!

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Solve the equation $x^3-12x^2+39x-28=0$, whose roots are in A.P.

OR

b Diminish the roots of the equation $x^4-4x^3-7x^2+22x+24=0$ by 1 and hence solve the equation.

12 a Show that the radius of curvature at any point of the cycloid x=a(0+sin0) and

13 a Show that $\int_0^{\pi/2} \frac{dx}{(\sin x)^{1/2} + (\cos x)^{1/2}} = \frac{\pi}{4}$.

OR

b Solve $\int e^{2x} \cos 3x\,dx$.

14 a Calculate $\iint xy\,dx\,dy$ taken over the positive quadrant of the circle $x^2+y^2=a^2$.

OR

b Calculate the area of the surface of the sphere of radius r.

15 a Explain cos 80 in terms of sin0.

OR

b If $\tan(x+iy)=u+iv$, show that $\frac{u}{v} = \frac{\sin 2x}{\sin 2y}$.

SECTION -C (40 Marks!

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

16 a Discuss the equation $x^4-8x^3+14x^2-8x-15=0$, given that the sum of two roots is equal to the sum of the other two.

OR

b Identify the solution of the equation $3x^6+x^5-27x^4+27x^2-x-3=0$.

17a If a curve is defines by the parametric equations x=f(0) and y=(t>(0), identify that the curvature is $y = \frac{x'y'' - y'x''}{(x'^2+y'^2)^{3/2}}$

OR

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

18 a Examine: $\int_0^{\pi/2} \log \sin x\,dx$.

OR

b Examine: $\int \sin^m x \cos^n x\,dx$.

19 a Discover $\iiint xyz\,dx\,dy\,dz$ taken through the positive octant of the sphere $x^2+y^2+z^2=a^2$.

OR

b Justify the volume at the position of the centre of gravity of the tetrahedron bounded by the plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ and the coordinate planes.

20 a Discuss: $\lim \frac{\sin x + \cos 2x}{\cos^2 x}$.

OR

b Differentiate into real and imaginary parts tan'*(x+iy).