Trigonometry Fourier series and vector calculus

K1 QUESTIONS:

UNIT 1:

1. Each series continues till one of the factors in the numerator is ……….. and then ceases .

a.) 0 **b.) 1** c.) 4 d.) -1

2. Series are in descending powers of cos nθ and _________ of sin nθ

a.) 0 b.) 1 c.) 4 **d.) -1**

3. The co-efficient of cos in the expansion of 2^{n-1} cos ^{n} θ is _____________

a.) nC(n-1). b.) nC(n-2)/2. c.) nC(n-1)/2. d.) nC(n+1)/2.

4. The number of terms in the expansion is odd. The signs term are alternative then the last term will be ___________.

a.) both positive and negative **b.)positive** c.) negative d.)none of these

5. θ must be measured in __________.

a.) radius b.) minutes c.) radians d.) none of these

6. The negative sign is discarded, then each angle involved being ____________.

a.) acute **b.) obtuse** c.)right d.)straight

7. Binomial theorem can be expanded on right hand side when n is ________integer.

a.)neither negative nor positive b.) none of these **c.) negative** d.)positive

8. sin nθ= _________________.

a.) cos ^{n}θ - n(n-1)/2!.cos^{n-2}θ. sin^{2}θ+..

b.) n cos^{n-1}θ sinθ - n(n-1) / 3! . cos^{n-3}θ sin ^{3}θ+...

c.) - cos ^{n}θ + n(n-1)/2!.cos^{n-2}θ. sin^{2}θ-..

d.) -n cos^{n-1}θ sinθ + n(n-1) / 3! . cos^{n-3}θ sin ^{3}θ-..

9. cos nθ= ________________________.

a.) cos ^{n}θ - n(n-1)/2!.cos^{n-2}θ. sin^{2}θ+......................................

b.) n cos^{n-1}θ sinθ - n(n-1) / 3! . cos^{n-3}θ sin ^{3}θ+.........................

c.) $- \cos^{n}\theta + n(n-1)/2!.\cos^{n-2}\theta.\ \sin^2\theta$-......................................

d.) $-n \cos^{n-1}\theta \sin\theta + n(n-1) / 3!\ .\ \cos^{n-3}\theta \sin^{3}\theta$-..........................

10. tan nθ = ___________________________.

a.) $-s_1 + s_3 - s_5 +$...................../ $-1+ S_2 - S_4 + S_6 -$ ....

b.) $s_1 - s_3 + s_5$ -...................../ $1- S_2 + S_4 - S_6 +$ ....

c.) $\cos^{n}\theta - n(n-1)/2!.\cos^{n-2}\theta.\ \sin^2\theta+$......................................

d.) $n \cos^{n-1}\theta \sin\theta - n(n-1) / 3!\ .\ \cos^{n-3}\theta \sin^{3}\theta+$..........................

UNIT 2:

1. ______________ series is used for all real values of X.

a.) Fourier b.) hyperbolic c.) Exponential d.)Fibonoaic

2. Cosθ + i sinθ is also known as __________formula.

a.)Euler's **b.) Exponential** c.) L'Hopital d.) Karl Pearson's

3. tan h (iθ)= _______________.

a.) $e^{i\theta} + e^{i\theta}/e^{i\theta} - e^{i\theta}$ b.) $e^{i\theta} + e^{i\theta}/e^{i\theta} + e^{i\theta}$ c.) $e^{i\theta} - e^{i\theta}/e^{i\theta} - e^{i\theta}$ d.) $e^{i\theta} - e^{i\theta}/e^{i\theta} + e^{i\theta}$

4. cos h^{-1}X= _________________

a.) cos x **b.) $\log_e(x+ \sqrt{x^2-1})$** c.) $\log_e(x-\sqrt{x^2-1})$ d.) $\log_e(x+ \sqrt{x^2+1})$

5. Sin h^{-1}x = __________________.

a.) $\log_e(x+ \sqrt{x^2+1})$ b.)$\log_e(x - \sqrt{x^2+1})$ c.) $\log_e(x - \sqrt{x^2+1})$ d.) i sin x

6. sin hβ.cos hβ = _______________.

a.) sin h 2β b.) 1 /2sin h 2β **c.) 1/2 cos h 2β** d.) cos h 2β

7. Expression of ____________hyperbolic function expressed in logarithmic function.

a.) positive **b.) negataive** c.) inverse d.) Exponential

8. tan 2θ = _____________.

a.) $\tan^2\theta / 1 - \tan^2\theta$ b.) $1 + \tan^2\theta / 1 - \tan^2\theta$

c.) $2 \tan \theta / 1 + \tan^2\theta$ d.) $2 \tan \theta / 1 - \tan^2\theta$

9. sin h(x ± y) = _______________.

a.) sin hx. cos hy ± cos hx. sin hy.

b.) sin hy. cos hx ± cos hy. sin hx.

c.) cos hx. cos hy ± sin hx. sin hy.

d.) cos hy. cos hx ± sin hy. sin hx.

10. cos h(x ± y) = ______________________.

a.) sin hx. cos hy ± cos hx. sin hy.

b.) sin hy. cos hx ± cos hy. sin hx.

c.) cos hx. cos hy ± sin hx. sin hy.

d.) cos hy. cos hx ± sin hy. sin hx.

UNIT 3:

1. An function represented by a fourier series in an interval of length ___________.

a.) 2π **b.) $-\pi$** c.) π d.) 2π

2. The series is uniformly convergent in the interval ______________.

a.) $\lambda - 2\pi \leq X \leq \lambda$ b.) $\lambda \leq X \leq \lambda + 2\pi$

c.) $\lambda \leq X \leq \lambda - 2\pi$ d.) $\lambda + 2\pi \leq X \leq \lambda$

3. f(x) must never become _____________in the defined interval.

a.) infinite **b.) zero** c.) 1 d.) -1

4. f(x) must be _____________valued.

a.) double **b.) single** c.) triple d.) finite

5. f(x) have a most at most ____________ number of maxima and minima in the interval of a definition.

a.) infinite b.) 0 **c.) finite** d.) finite

6. __________ series can be expanded in interval from 0 to 2π.

a.) Exponential b.) Fibonoaic c.) Euler's d.) Fourier

7. Fourier expansions of any linear and __________ function of x.

a.) Quadratic b.) Exponential **c.) Binomial** d.) Polynomial

8. $f(x) = a_0/2 + a_1 \cos x + a_2 \cos 2x + \ldots\ldots + b_1 \sin x + b_2 \sin 2x + \ldots\ldots$

the series is called a ___________ series.

a.) Exponential b.) Fibonoaic c.) Euler's **d.) Fourier**

9. f(1)=f(-1) is called a ……………….function

a.) $\frac{1}{\pi}$ b.) 0 **c.) odd** d.) even

10. The unit vector normal to the space curve is then n is called __________ .

a.) unit principal perpendicular b.) unit principal parallel

c.) unit principal normal **d.) unit principal function**

UNIT 4:

1. Divergence theorem enables to convert ____________ integral into volume integral and stoke's theorem.

a.) Area **b.) surface** c.) Plane d.) Double

2. ϕ is a ___________ point.

a.) neither vector nor scalar **b.) Both scalar and vector** c.) Vector d.) Scalar

3. Orientatioin of the boundary is ___________ to C.

a.) not equal b.) equal c.) opposite d.)parallel

4. C and S are ___________ curve.

a.) closed **b.) open** c.) symmetrical d.)asymptotical

5. Divergence and curl do not depend on any particular _______ system.

a.) independent **b.) number** c.) trignometrical d.) co-ordination

6. Surface which are intersected by a straight line ______ to co-ordinate axis in a point.

a.) closer **b.) parallel** c.) opposite d.)equal

7. Central theorems on __________ gives Gauss divergence and Stoke's theorem.

a.) integration b.) differentiation **c.) partial differentiation** d.)multiplication

8. ___________function is defined at parametric equations whose points are all at curves $r= f_1(u)\, i+ f_2(u)j + ...$ $u_1 \leq u \leq u_2$.

a.) Scalar **b.) Vector**

c.) Both scalar and vector d.)neither vector nor scalar

9.For every value of scalar t, a vector F(t) is defined, therefore F(t)d is_______________

a**.) scalar function** b.)vector function c.)unit function d.)none of these

10.F= I x(t)+ j y(t)+ k z(t) in this equation I j k is denoted as ________________.

a.) perpendicular vector **b.)parallel vector** c.)unit vector d.)tangent vector

Unit 5:

1. Cross products vector is not changed during ________________.

a.) vector differentiation b.) partial differentiation

c.) integration d.) differentiation.

2. Restriction is due to anti-commutative nature of vector _______________.

a.) addition b.) multiplication c.) subtraction d.)division

3. The directional derivative is maximum when cos θ = ______________.

a.) 1 b.) 0 c.) -1 d.) ∞

4. ____________ divertive at arbitrary direction is |Δ ϕ| cosθ .

a.) Scalar **b.) Directional** c.) Partial d.) Non-directional

5. Directional is maximum along the ___________ to level surface.

a.) equal **b.) perpendicular** c.) normal d.) parallel

6. ____________ depends only on ϕ independent of axes.

a.) Both Scalar and Vector b.)none of these c.)Scalar d.) Vector

7. Harmonic function is obtained by satisfaction of ____________ equation.

a.) laplace **b.) Polynomial** c.) Binomial d.) Quadratic

8. Solinoidal vector if Δ.Δ=___________.

a.) 1 **b.) 0** c.) -1 d.) ±1

9. Irrotational vector if ΔxΔ=______.

a.) 1 b.) 0 **c.) -1** d.) ±1

10. ___________ value of directional derivatives is | Δ ϕ| .

a.) Vector b.) Scalar c.)minimum d.)maximum

K2 QUESTIONS:

UNIT 1:

1. If α,β,γ be the roots of the equation $x^3+px^2+qx+p=0$, then $\tan^{-1}\alpha+\tan^{-1}\beta+\tan^{-1}\gamma=$ …………………

Answer : n π

2. $x^2+\frac{1}{x^2}$ = ………………

Answer : 2 sin 2θ

3. $x^2 - \frac{1}{x^2}$ = ………………

Answer : 2.i.sin2θ

4. Expand $\sin^4\theta \cdot \cos^2\theta$ =………....... in a series of cosines of multiples of θ.

Answer : $\frac{1}{\ }$ (cos 6θ – cos 2θ – 2 cos 4θ + 2

5. Solve approximately in radians $\sin(\frac{\ }{3} + x)$ = ……………………

Answer : -$\frac{1}{\ }$

6. $e^{-i\theta}$ =………………………

Answer : cos θ – i.sin θ

7. $\sin^3\theta. \cos^5\theta$=………………………

Answer : $\frac{1}{\ }$(sin 8θ + 2 sin 6θ – 2 sin 4θ – 6 sin2θ)

8. cos 4θ = …………………………

Answer : 1 – $\sin^2\theta$ + $\sin^4\theta$

9. tan 5θ = ………………………

Answer : $\frac{\tan\theta - \tan\ \theta \quad \tan}{1 - 10 \tan}$

10. cos 5θ = …………………………

Answer : 16 $\cos^5\theta$ – 20$\cos^3\theta$ + 5 cos θ

UNIT 2:

1. cos hx = ………………….

Answer : $\frac{-}{\ }$

2. sin hx =………………………

Answer : $\frac{- \quad -}{\ }$

3. $\cos h^2x - \sin h^2x$ =……………..

Answer : 1

4. sin h2x =……………………….

Answer : i.sin 2x

5. cos h2x **=…………………………**

Answer : cos 2x

6.If cos hu = sec θ , then u= ………………………..

Answer : log tan($-$ + $\frac{\theta}{}$)

7. cos (x + iy) = cos θ + i.sinθ, then cos 2x + cos h2y =………………………

Answer : 1

8. cos ix =……………………..

Answer : cos hx

9. sin ix=……………….

Answer : i.sin hx

10. tan hiθ=……………………

Answer : i.tan hθ

UNIT 3:

1.b_n=…………………

Answer : surface

2.If f(x) = - f(x) then f(x) is said to be a/an ………………. Function.

Answer : parallel

3. If f(x) = f(x) then f(x) is said to be a/an ………………. Function.

Answer : independent

4. If f(x) = cos x then the function is said to be a/an ……………. Function.

Answer : vector function

5. If f(x) = sin x then the function is said to be a/an ……………function.

Answer : scalar function

6. If f(x)= x^3-x^2 then the function is said to be a/an ……………. Function.

Answer : unit function

7. If f(x) = x^5-x then the fucntion is said to be a/an ……………..function.

Answer : scalar function

8. If f(x)= x^3-x^2 then the function is said to be a/an ……………. Function.\

Answer : unit function

9. If f(x) = x^5-x then the fucntion is said to be a/an ……………..function.

Answer :vector function

10. If f(x) = tan x then the function is said to be a /an …………………..function.

Answer : unit function

Unit 4:

1.The derivative of a constant vector is ________________.

Answer : 1

2.The direction increasing length is usually to indicate $\frac{dr^{-1}}{ds}$ by t, t is often called as ________

Answer :unit vector

3. For every different values of C different level surface of obtained and no __________ level surface will be intersector.

Answer :one

4. ϕ is said to defined a scalar field ϕ is also set to be a ________________

Answer: vector point function

5. Temperature and density of body is an example of ____________ .

Answer: scalar point function

6. $\frac{d\emptyset}{ds}$ called the ____ of ϕ.

Answer: directional derivative

7. The directional derivative of ϕ(x, y, z) is any direction is of ________ Δϕ and the unity in that direction .

Answer: dot product

8. Δϕ and $\frac{dr^{-1}}{ds}$ has same direction and the maximum value of $\frac{d\phi}{ds}$ is ________

Answer: Δϕ

9. Δϕ.$\frac{dr^{-1}}{ds}$= 0 Δϕ acts in a direction __________ to the direction of $\frac{dr}{ds}$.

Answer: parallel

10. Vector point function are __________ Body and the pressure of column of fluid.

Answer: mass

UNIT 5:

1.)In the line integral $\int \quad dr$ represents the…………………… (F) acting along the curve C.

Answer: Force

2.) If F=□Ø we have curl F=□.□Ø =__________ .

Answer: 1

3. The Gauss divergence theorem is $\iint \quad . \quad . d$ =………………………………….

Answer: $\iiint \quad \boldsymbol{n}.$

4. The Green's theorem is $\iint \quad . \quad . d$ =………………………………….

Answer: $\iint \quad \boldsymbol{n} . \Delta.$

5.$\iiint$ □. $. d$ =

Answer: $\iint \quad \boldsymbol{n}. \quad .$

6.$\int$ is independent of the path of integration then $\int \quad . dr$ along any closed path is ………………………

Answer: 1

7. $\int^{d} \quad . dr$=………………….. when C is traversed in the positive direction.

Answer: 0

8. $\int^{d} \quad .r.dr$ ……………………….

Answer: $\iint^{\boldsymbol{t}} \boldsymbol{n}\Delta.$

9. If P,Q —,f—^{Q}are continuous and one valued function in the region R enclosed by the curve C, then

$\int^{d} \quad dx \quad Q\, d$ =……………………….

Answer: 1

10.Evaluate $\iiint \quad d$ where F= x^2i + y^2j + z^2k and V is the volume enclosed by the cube 0≤ x, , ≤ 1 = …………………..

Answer: 1

TRIGONOMENTRY

K2 QUESTIONS:

UNIT 1:

1. Verify stokes theorem when $F=(2x-y)i-yz^2j-y^2k$ at (1,-1,2).
2. Find the magnitude and the direction of the greater change of $U=xyz^2$ at (1,0,3).
3. Find the sine series for f(x)=c in the range o to π.
4. If cos(x+iy)=cosθ+ isinθprove that cos(2x)+cosh2y=2.
5. Expand cos 4θ.
6. Expand $\sin^7\theta$ in a series of signs of multiples of θ.
7. Separate into real and imaginary parts $\tan^{-1}(x+iy)$.
8. Find a sine series for f(x)=c in the range 0 to π.
9. Find the unit vector normal to the surface $x^2+2y^2+z^2=7$ at(1.-1.2).
10. Define surface integral**.**

UNIT 2:

11. If cos h u=secθ. Show that u=log(tan(π/4+θ/2)).
12. Separate into real and imaginary parts tanh(1+i).
13. Expand tan 4θ in terms of tanθ amd show that tan π/16 tan 5π/16 tan 9π16 tan 13π/16 are the roots of the equation.
14. Express f(X)= ½(π-x) has an fourier series with period 2π to be valid in the interval 0-2π.
15. Find the unit vector normal to the surface $X^2+2y^2+z^2=7$ at (1,-1,2).
16. Evaluate ∭ f dv where $F= 2xzi-xj+y^2k$ and v is the volume enclosed by the cylinder
17. Express sin7θ/sinθ in terms of sin θ.
18. Expand cos 4θ.
19. Express sin6θ/sinθ.
20. Evaluate the area of the circle $x^2+y^2=a^2$ between the planes z=0 and z=c.

UNIT 3:

21. Evaluate ∬F.nds where $F=xi+yj-zk^2$ and s is the sphere $x^2+y^2+z^2=a^2$ above the xoy plane.
22. Prove that $v=r^n.r$ is irotational .Find n when it is also solenoidal.
23. Find Its range -π to π a fourier series for Y=1+x 0<x<π Y=-1+x π<x<0.
24. separate into real and Imaginary parts tan h (1+i).
25. Find the equation whose roots are tan 5π/5 tan 2π/5 tan 3π/5 tan 4π/5.
26. Find the equation whose roots are 2cos 2π/7, 2cos 4π/7, 2cos 6π/7.
27. Separate into real and imaginary parts tan h(1+i).
28. Express f(x)= x(-π<x<π) as a fourier series with the period 2π.
29. Find the unit vector normal to the surface x2+2y2+z2=7 at (1,-1,2).
30. Find the workdone by the force field F(x,y)=(x2-xy)i + (y2-2xy)j in moving a particle from the point (1,1) to (2,4) along the parabola y=x2.

UNIT 4:

31. Express 8 cosθ in terms of sinθ.
32. Express sin6θ/ sinθ in terms of cosθ.
33. Find the equation whose roots are 2 cos 2π/7, 2 cos 4π/7, 2 cos 6π/7.
34. If be the roots of the equation x3+px2+qx+p =0, prove that tan-[1], tan-1 , tan-1 = n π radians except when q = 1.
35. Expand sin7 θ in a series of sines of multiples of θ.
36. Find the equation whose roots are tan π/5, tan 2π/5, tan 3π/5, tan 4π/5.
37. Find limθ = 0
38. Expand sin7 θ in a series of sines of multiples of θ.
39. If cosh u = sec θ, show that u = log tan (π/4 + θ/2).
40. Find the equation whose roots are 2 cos 2π/7, 2 cos 4π/7, 2 cos 6π/7.

UNIT 5:

41. Prove that tan π/11, tan 2π/11, tan 3π/11, tan 4π/11, tan 5π/11 =
42. Show that cos π/9, cos 2π/9, cos 4π/9 = 1/8.
43. Expand sin 7θ as a polynomial in sin θ. Hence, obtain the cubic equation whose roots are sin2 2π/7, sin2 4π/7, sin2 6π/7.
44. If cos (x+iy) = cos θ + i sin θ, prove that cos 2x + cos 2y = 2.
45. If cosh (a+ib) cos (c+id) = 1. Prove that
    I) cos b cos c cosh a cosh d + sin b sin c sinh a sinh d = 1.
    II) tanh a tan b = tanh d tan c.
46. Separate into real and imaginary parts tan-1 (x + iy).
47. . Express f(x)= x(-π<x<π) as a fourier series with the period 2π.
48. Find the unit vector normal to the surface x2+2y2+z2=7 at (1,-1,2).
49. Find the workdone by the force field F(x,y)=(x2-xy)i + (y2-2xy)j in moving a particle from the point (1,1) to (2,4) along the parabola y=x2.
50. State and prove Gauss divergence theorem.

TRIGNOMENTRY

K3 QUESTIONS:

UNIT 1:

1. Expand $\sin^7\theta$ in a series of signs of multiples of θ

2. Separate into real and imaginary parts $\tan^{-1}(x+iy)$.

3. Find a sine series for f(x) = c in the range 0 to π.

4. Find the unit vector normal to the surface $x^2+2y^2+z^2=7$ at (1.-1.2)

5. Define line, volume and surface integral.

UNIT 2:

1. Prove that the equation $\frac{ah}{\cos\theta} - \frac{bk}{\sin\theta} = a^2 - b^2$ has four roots and that the sum of the four values of θ which satisfy it is equal to an odd multiple of π radians.

2. Expand sin 7θ as a polynomial in sin θ. Hence, obtain the cubic equation whose roots are $\sin^2 2\pi/7$, $\sin^2 4\pi/7$, $\sin^2 6\pi/7$.

3. Show that cos π/9, cos 2π/9, cos 4π/9 = 1/8.

4. Expand $\sin^4\theta \cos^2\theta$ in a series of cosines of multiples of θ.

5. Prove that tan π/11, tan 2π/11, tan 3π/11, tan 4π/11, tan 5π/11 = $\sqrt{11}$.

UNIT 3:

1. If sin θ/ θ = 5045/5046, show that θ = 1^0 58' approximately.

2. If cos (x+iy) = cos θ + i sin θ, prove that cos 2x + cos 2y = 2.

3. If cosh (a+ib) cos (c+id) = 1. Prove that

   i) cos b cos c cosh a cosh d + sin b sin c sinh a sinh d = 1.

   ii) tanh a tan b = tanh d tan c.

4. Separate into real and imaginary parts tanh (1 + i)

5. Separate into real and imaginary parts $\tan^{-1}(x + iy)$.

UNIT 4:

1.Solve $X^2 (d^2 y/dx^2)+3x(dy/dx)+y=1/(1-x)^2$

2.Solve $(D^2+2D+5)y=e^x . X$

3.Solve $(D^2+4D+5)y = e\ x + x\ 3 + \cos(2x)$

4.Solve $(D^2-4D+3)y=\sin(3x).\cos(2x)$

5.Solve $(D^2-2mD+m\ 2)y=e^{mx}$

UNIT 5:

1.$\iint xydx\ dy$ taken over the positive quadrant of circle $x^2+y^2=a^2$.

2.$\iint(x^2+y^2)dxdy$ over the region for which each greater then are equal to 0 and $x+y\leq 1$.

3.$\iint xy\ dxdy$ taken over the positive quadrant of the ellipse.

4.$\iint x^3y\ dxdy$ over the region for which x and y are greater then are equal to zero and $x^2/a^2+y^2/b^2\leq 1$

5.find the value of $\iint(a^2-x^2)dxdy$.taken over the upper half of the circle $x^2+y^2=a^2$.