17/11/2017

Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore-641 043
Bachelor's DegreeExamination – November-2017
III Semester

Class: II UG **Time :3 hours**
Major : Sp. Edn. & Mathematics **Max.Marks: 100**

15BSMC06- Vector Analysis

Part-A **10x1=10**

Choose the correct answer

1. If v is the vector representing the velocity, then the acceleration a =..............
   a.$\frac{dv}{dt}$ b.$\frac{dt}{dv}$ c.$\frac{da}{dt}$ d) $\frac{dt}{dt}$
2. The derivative of constant vector is
   a.0 b.1 c.constant d)none
3. Example for vector point function is
   a) velocity of a body b) pressure of a column c) both d) none
4. A vector is solenoidal if the divergence is -----------------
   a.0 b.1 c.constant d)none
5. $\nabla . f\ is$ – – – – – – – – – – – – –
   a) scalar b) vector c) vector point d) scalar point
6. $\nabla(u+v) =$
   a)$\nabla u + \nabla v$ b) $\nabla u + u\nabla v$ c) $v\nabla u + \nabla v$ d)$u\nabla u + v\nabla v$
7. $\nabla . (\nabla F) =$ – – – – – – –
   a) 1 b) -1 c) 0 d) none
8. If F =$\nabla\phi$ then curl F = – – – –
   a) c b) 1 c) -1 d) none
9. V=$r^n r$ is ----------------
   a) solenoidal b) irrotational c) both a and b d) none
10. If a function satisfies Laplace equation it is called as ------------
    a) harmonic b) conjugate c) continuous d) none

Part-B **5X6=30**

Answer the following
Answer should not exceed 400 words or two pages

11.a.Find the direction and magnitude of greatest circle u=xyz^2 at (1,0,3)

(or)

11.b.Prove that $\frac{d}{dt}(R \times S)$=R$\frac{ds}{dt}$ +S$\frac{dR}{dt}$

12.a.Prove that$\nabla.3 = 3 and \nabla \times R = 0$

(or)

12.b.Compute divergence and curl of $x^2i+y^2j+z^3k$ at (1,2,-3)

13.a. Prove that $\nabla(uv) = v\nabla u + u\nabla v$

(or)

13.b.Prove that $\nabla x \nabla\phi = 0$

14.a.Find $L^{-1}[\frac{s}{(s^2-1)^2}]$

(or)

b.Find$L^{-1}\left[\frac{s-3}{s2+4s+13}\right]$

15.a. Evaluate $\iint_s [(x^3 - yz)dzdx - 2x^2ydzdx + zdxdy]$ taken over a cube of side a, three of whose edges lie along the coordinate axis.

(or)

b. Show that $\int_c A \times \bar{r} \, . dr = 2 \iint_s n. A \, ds$ where A is a constant vector.

Part C **5x12=60**

Answer the following

16. a.Find the directional derivative of $\phi(x,y,z)=xy^2yz^3$ at the point (2,-1,1) in the direction of the vector i+2j+2k

(or)

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

17. a.If V=w× r, *prove that* $w = \frac{1}{2}$ curl V

(or)

b.Compute the divergence and curl of the vector $F=xyzi+3x^2yj+(xz^2-y^2z)k$ at (1,2,-1

18. a.Prove that $\nabla.(\nabla \times F) = 0$ and $\nabla \times \nabla\phi = 0$

(or)

b. If a vector is irrotational then show that it is the gradient of scalar point function

19. a.Given the vector field $\bar{F}=xzi+yzj+z^2K$,evaluate $\int_C \bar{F}.d\bar{r}$ from the point (0,0,0) to (1,1,1)

(or)

b.Show that the value of the integral $\int_{(0,0)}^{(1,2)} 3x(x+2y).dx + (3x^2 - y^3)$ dy is independent of the path of integration and evaluate by any of the method

20. a. If $F=2xyi+yz^2j+xzk$ and S is a rectangular parellopiped bounded by x=0,y=0,z=0,x=2,y=1,z=3, evaluate $\iint_s F.n \, ds$

(or)

b. Verify Stokes theorem when $\bar{F}$=(2x-y)i-yz^2 j-y^2zk, where s is the upper hemisphere of the unit sphere $x^2+y^2+z^2=1$ and C is its boundary.

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