

V.P. AND R.P.T.P. SCIENCE COLLEGE
ARREAR EXAMINATION
B.Sc.SEMESTER -IV
US04EMTH05
(CALCULUS AND ALGEBRA - II)

Date :19/03/2018

Day :Monday

Maximum Marks : 25

Time : 3.00 pm to 4.00 pm

Que.1 Attempt the following.

3

(1) The divergent of vector field $\vec{v} = x^3\vec{i} + e^{3z}\vec{k}$ is.....

- (a) $3x\vec{i} + 3e^{3z}\vec{k}$ (b) $3x^2 + 3e^{3z}$ (c) $3x^2 + 3e^{3k}$ (d) $3x + e^{3k}$

(2) $\vec{\nabla} \times (\vec{\nabla} f) = \dots\dots\dots$

- (a) 0 (b) $\nabla^2 f$ (c) $(\nabla f)^2$ (d) $2\vec{\nabla}$

(3) For $a \in B$, if a' is complement then $(a \cdot a')(a + a') = \dots\dots\dots$

- (a) a (b) a' (c) 0 (d) $a \cdot a'$



Que.2 Attempt the following (Any two).

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(1) Find normal vector of $\log \vec{r}$ where $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$

(2) Prove that $\vec{\nabla} \cdot (\vec{u} \times \vec{v}) = \vec{v} \cdot (\vec{\nabla} \times \vec{u}) - \vec{u} \cdot (\vec{\nabla} \times \vec{v})$

(3) find $\vec{\nabla} \cdot \left(\frac{\vec{r}}{r^3}\right)$ where $\vec{r} = x\vec{i} + y\vec{j}$

Que.3 Find directional derivative of $F(x, y, z) = 4xz^3 - 3x^2y^2z$ at point (2,-1,2) in the direction $\vec{a} = \vec{i} - 2\vec{k} + \vec{j}$.

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OR

Que.3 Check whether the function $\frac{x}{y^2 + x^2}$ is harmonic or not.

6

Que.4 Verify $\vec{\nabla} \cdot (f\vec{v}) = f(\vec{\nabla} \cdot \vec{v}) + \vec{v} \cdot \vec{\nabla} f$ for $f = e^{xyz}$ and $\vec{v} = ax\vec{i} + by\vec{j} + cz\vec{k}$.

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OR

Que.4 Find $\vec{\nabla} \cdot (r^n \vec{r})$ where $r = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = |\vec{r}|$

6

Que.5 State and prove Associative law for Boolean algebra B.

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OR

Que.5 State Network types, draw and simplify the function $cb + ab'cd + cd' + ac' + a'bc' + b'c'd'$.

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