

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

Date : 19/03/2016

Day : Saturday

Maximum Marks : 25

Time : 3 pm to 4 pm

Q.1 Attempt the following.

(1) The solution of Laplace's equation is called....

(a) Constant function (b) Continuous function

(c) Harmonic function (d) Laplacian operator

(2) The divergent of vector field $\bar{v} = x^3\bar{i} + 4y^2\bar{j}$ is.....

(a) $3x^2 + 8y$ (b) $2x^2 - 2y$ (c) 0 (d) $2x$

(3) For Boolean algebra B, $a + a = \dots\dots\dots$

(a) $2a$ (b) 0 (c) 1 (d) a



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Q.2 Attempt the following (Any two).

(1) Find $\bar{\nabla} \cdot (f\bar{\nabla}g)$

(2) Find $\bar{\nabla} \cdot \left(\frac{\bar{r}}{r^3}\right)$, where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$

(3) Define Boolean Algebra.

Q.3 Find directional derivative of $f(x, y, z) = 2x^3 + 3y^2 + z^3$ at point (1, 2, 3) in the direction $\bar{a} = \bar{i} - 2\bar{k}$.

6

OR

Q.3 Prove that $\tan^{-1}\left(\frac{x}{y}\right)$ is harmonic function.

6

Q.4 Find $\bar{\nabla} \cdot (r^n\bar{r})$, where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$

6

OR

Q.4 If $f(x, y) = \log(x^2 + y^2)$ then prove that $\nabla^2 f = 0$

6

Q.5 Prove that in Boolean algebra B, binary operation is associative.

6

OR

Q.5 Find the Boolean function, simplify it and draw the simplified circuit for the given circuit

6

