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

Date : 19/03/2015 Maximum Marks : 25
Day : Thursday Time : 10:30 am to 11:30 am

Que.1 Attempt the following. 3

(1) Let $f(x,y,z)$ be scalar point function then $\overline{\nabla} f = 0$ iff f is.....

(a) Constant function (b) Continuous function

(c) Harmonic function (d) Laplacian operator

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(2) The divergent of vector field $\overline{v} = x^2\overline{i} - y^2\overline{j}$ is.....

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

(3) For Boolean algebra B, $a + 1 =$ .....

(a) a (b) 0 (c) 1 (d) none

Que.2 Attempt the following (Any two). 4

(1) Find $\overline{\nabla}(\log r), where\ \overline{r} = x\overline{i} + y\overline{j}$

(2) Find gradient of $\left(\frac{f}{g}\right)$

(3) Draw network represented by following functions. (1) $(x+y')x$ (2) $x(xy+yz+zx)$

Que.3 Find directional derivative of $f(x,y,z) = 2x^2 + 3y^2 + z^2$ at point (1 ,2 ,1) in the direction $\overline{a} = \overline{i} - 2\overline{k}$. 6

OR

Que.3 Find unit normal vector of the surface $z^2 = x^2 + y^2$ at (3,4,5). 6

Que.4 Verify $\overline{\nabla} \cdot (f\overline{\nabla} g) = f \cdot \nabla^2 g + \overline{\nabla} f \cdot \overline{\nabla} g$ for $f = x + y + z$ and $g = xyz$. 6

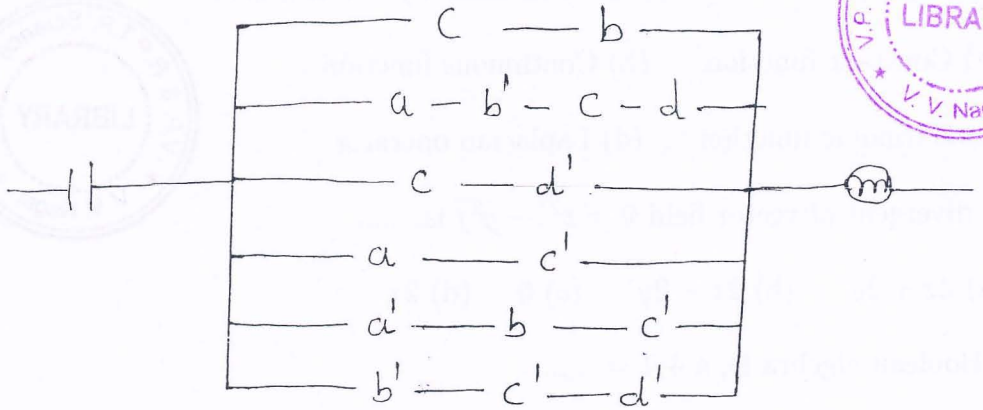
OR

Que.4 Prove that $\overline{\nabla} \cdot (\overline{\nabla} \times \overline{v}) = 0$ 6

Que.5 State and prove De-morgan's laws for Boolean algebra B. 6

OR

Que.5 Find the Boolean function, simplify it and draw the simplified circuit for the given circuit 6



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