

Extra

## VP & RPTP Science College-Vallabh Vidyanagar

US05CPHY02 Unit Test 2016

Date: 30/09/2016 Friday

Time: 11.00 am to 12.30 pm

Total Marks-25

**Q-1** Multiple Choice Questions: [Attempt all] 3

(i) The matrix of order  $n \times m$  obtained from any matrix  $A$  of order  $m \times n$ , by interchanging its rows and columns is called \_\_\_\_\_.

- (a) Inverse of a Matrix (b) Traspose of a Matrix  
(c) Cofactor of a Matrix (d) Adjoint of a Matrix

(ii) The generating function for Bessel's function of the order  $n$  is

- (a)  $e^x$  (b)  $e^{\frac{x}{2}(t-1)}$   
(c)  $e^{x(t-\frac{1}{t})}$  (d)  $e^{\frac{x}{2}(t-\frac{1}{t})}$

(iii) Shift operator  $E =$  \_\_\_\_\_.

- (a)  $\nabla + 1$  (b)  $\Delta - 1$   
(c)  $\Delta + 1$  (d)  $\delta + 1$



**Q-2** Answer the following questions in short [Attempt any two]. 4

- (a) Write Laplacian in terms of orthogonal curvilinear co-ordinates.  
(b) Write Hermite differential equation.  
(c) Convert  $y = ae^{bx}$  in to equivalent equation of a straight line.

**Q-3** Derive expression of divergence in terms of orthogonal curvilinear coordinates. 6

**OR**

**Q-3** Prove that the product of sets of two triads of mutually orthogonal vectors are reciprocal to each other. 6

**Q-4** Derive the series solution of Legendre differential equation in the form of descending power of  $x$ . 6

**OR**

**Q-4** State and Derive the Rodrigue's formula 6

**OR**

**Q-5** Derive Newton's forward difference interpolation formula and evaluate  $f(15)$  from the following table of values. 6

$x$	10	20	30	40	50
$y = f(x)$	46	66	81	93	101

**OR**

**Q-5** Find Lagrange's interpolation polynomial that fits the given data and evaluate  $y = f(5)$ . 6

$x$	1	3	4	6
$y = f(x)$	-3	0	30	132