VP & RPTP Science College-Vallabh Vidyanagar

US05CPHY02 Internal Test 2017

Date: 04/10/2017 Wednesday Time: 11.00 am to 12.30 pm Total Marks-25

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

(i) For matrices A and B, product AB is possible only if two matrices are_____.

(a) A_{mxn} and B_{nxp} (b) A_{mxn} and B_{mxp}

(c) A_{nxn} and B_{mxn} (d) A_{mxm} and B_{nxn}

(ii) The amount of heat ΔH crossing an element of surface ΔS in time Δt is given by

(a) $\Delta H = K\,\Delta t \left|\frac{du}{dt}\right|$ (b) $\Delta H = K\,\Delta S \left|\frac{du}{dt}\right|$

(c) $\Delta H = K\,\Delta S\,\Delta t \left|\frac{du}{dt}\right|$ (d) $\Delta H = K\,\frac{\Delta S}{\Delta t} \left|\frac{du}{dt}\right|$

(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) If $u = 3x + 2, v = y - 5, w = z + 3$, show that u, v, w are orthogonal.

(b) Write sine series for $f(x)$, when $0 \le x \le \pi$.

(c) Convert $y = ax^b$ in to equivalent equation of a straight line.

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

OR

Q-3 Discuss cylindrical co-ordinates as a special curvilinear system. **6**

Q-4 Write the Fourier series for a periodic function $f(x)$ defined in the interval $[-\pi, \pi]$. **6**
Derive the coefficients a_0, a_n and b_n of the series.

OR

Q-4 Derive one dimensional diffusion equation for one dimensional flow of electricity in a long insulated cable. **6**

Q-5 Derive Newton's backward difference interpolation formula and evaluate $f(45)$ 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