NCE-003-1272003 Seat No. ________

M. Sc. (ECI) (Sem. II) (CBCS) Examination

April / May – 2017

Paper-07 : Mathematics for Electronics
Faculty Code : 003
Subject Code : 1272003

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (i) **All** questions carry **equal** marks.
(ii) Figures on **right** hand side indicate marks.

1 Answer the following question in brief : (any **seven**) **14**

(1) $\hat{i} \times \hat{i} =$.......

(2) $\hat{i}.\hat{J} =$.......

(3) Define Curl $\overline{v}$

(4) $\dfrac{dx^n}{dx} =$......

(5) Define $\int \sin x \, dx$

(6) If $Z = 2 + i5$ then Re (Z)=..........

(7) $i^{200} =$.......

(8) If $z = \cos\theta + \sin\theta$ then $|z| =$........

(9) If $Z = \cos\theta + \sin\theta$ then $Z =$.......

(10) Evaluate $\int_0^1 \left(x^2 + 2x + 1\right) dx$

2 Answer any **two** of the following questions : (Each 7 marks) **14**

(1) Find the volume of parallelepiped if $\overline{a} = -3\hat{i} + 7\hat{J} + 5\hat{k}$, $\overline{b} = -3\hat{i} + 7\hat{J} - 3\hat{k}$ and $\overline{c} = -7\hat{i} - 5\hat{J} - 3\hat{k}$ are the three co-terminus edges of the parallelepiped.

(2) Show that the volume of the tetrahedron having $\overline{A}+\overline{B}$, $\overline{B}+\overline{C}$, $\overline{C}+\overline{A}$ as concurrent edges is twice the volume of the tetrahendrom having $\overline{A}, \overline{B}, \overline{C}$ as concurrent edges.

(3) $\int_0^1 \int_0^x \left(x^2 + y^2\right) dA$, where dA indicates small area in xy-plane.

3 Answer the following questions : **14**

(1) Evaluate $\int_0^{\frac{\pi}{2}} \int_{a(1-\cos\theta)}^{a} r^2 \, dr \, d\theta$. **5**

(2) Find the area bounded by the parabola $y^2 = 4ax$ and its latus ractum. **5**

(3) Evaluate $\int_{-1}^{1} \int_{-2}^{2} \int_{-3}^{3} dx \, dy \, dz$. **4**

OR

3 Answer the following questions : **14**

(1) Find the volume of the tetrahedron bounded by the planes $x = 0, y = 0, z = 0$ and $x + y + z = a$. **5**

(2) Simplify the following (a) I^{49}, (b) I^{103}. **5**

(3) If $Z = 1 + i$, find (a) Z^2 (b) $\frac{1}{Z}$. **4**

4 Answer the following questions : **14**

(1) Find the smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = 1$. 7

(2) Determine the differential equation whose set of independent is 7

$\left\{e^x, xe^x, x^2e^x\right\}$.

5 Answer any **two** of the following questions : (Each 7 marks) **14**

(1) Express in polar form : $1-\sqrt{2}+i$. 7

(2) Express $\frac{(\cos\theta + i\sin\theta)^8}{(\sin\theta + i\cos\theta)^4}$ in the form $(x+iy)$. 7

(3) State and prove Green's theorem for a plane. 7

(4) State only Stoke's theorem and Gauss theorem of divergence. 7