

## List for Practicals of B.Sc. III(Maths)

Sub: Mathematics Practical  
Class: B.Sc III (Maths)

PaperNo.XIX (MP307)  
Max.Marks:100

w.e.f.-2011-12

### SECTION:A

#### Solving Problems in Algebra

1] Determine whether the set of vectors  $v_1=(2,1,0,3)$ ,  $v_2=(3,-1,5,2)$ ,  $v_3=(-1,0,2,1)$  are linearly independent in  $R^4$ .

2] Determine whether the set  $B=\{(3,1,-4),(2,5,6),(1,4,8)\}$  is a basis of  $R^3$ .

3] Show that the vectors  $u_1=(2,-1,0,3)$ ,  $u_2=(1,2,-5,1)$ ,  $u_3=(7,-1,5,8)$  are linearly dependent.

4]  $u=(1,3,-4,2)$ ,  $v=(4,-2,2,1)$  find

i)  $\langle u, v \rangle$  inner product of  $u$  and  $v$ .

ii)  $\cos \theta$  for  $u$  and  $v$  then  $\theta=?$

iii)  $\|u\|, \|v\|$ .

iv)  $\|u-v\|$ .

5]  $u=(1,6,4,2,1)$ ,  $v=(8,4,-12,2,10)$  find

i)  $\langle u, v \rangle$  inner product of  $u$  and  $v$ .

ii)  $\cos \theta$  for  $u$  and  $v$  then  $\theta=?$

iii)  $\|u\|, \|v\|$ .

iv)  $\|u-v\|$ .

6] Find Eigen value for the matrix  $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 4 \\ -1 & -1 & -2 \end{bmatrix}$

7] Find Characteristic polynomial for the matrix  $A = \begin{pmatrix} 3 & 5 & 0 & 1 \\ 3 & 4 & -3 & 0 \\ 1 & 0 & 2 & -4 \\ 6 & 3 & 1 & 2 \end{pmatrix}$

8] Check Ortonormality of following sets

i)  $B = \{ u_1=(2,-1,0,3), u_2=(1,2,-5,1), u_3=(7,-1,5,8) \}$

ii)  $E = \{ u_1=(1,0,0,0), u_2=(0,1,0,0), u_3=(0,0,1,0), u_4=(0,0,0,1) \}$

## SECTION: B

### Problems in PDE

- 1] Wave Equation (P-641, Art 9.17 Ex 4 Advanced Engg. Maths by H K Dass )
- 2] One-Dimensional heat flow (P-651, 9.19 Ex 11, Advanced Engg. Maths by H K Dass)
- 3] Two-dimensional heat flow (P-655, 9.20 Ex 13 , Advanced Engg. Maths by H K Dass)
- 4] Two-dimensional heat flow (P-655, 9.20 Ex 14 , Advanced Engg. Maths by H K Dass)

## SECTION: C

### Solving Problems in Mechanics

- 1] Given  $\vec{a} = (1, 2, 3)$ ,  $\vec{b} = (3, 2, 5)$  find  $\vec{a} \cdot \vec{b}$ ,  $\vec{a} \times \vec{b}$ ,  $\vec{b} \times \vec{a}$ ,  $\left| \vec{a} \right| \left| \vec{b} \right|$  and  $\theta$ , by using Matlab.
- 2] Find the vector moment of the force  $\vec{f} = i + 2j + 3k$  acting at a point P (-1, 2, 3) about origin O(0, 0, 0).
- 3] A force is represented in magnitudes and direction by the line joining the point A(1, -2, 4), B(5, 2, 3) find its moment about a point O(-2, 3, 4) .
- 4] Find  $[\vec{a} \vec{b} \vec{c}]$  where i)  $\vec{a} = 2i - 3j$ ,  $\vec{b} = i + j - k$ ,  $\vec{c} = 3i - k$  .  
ii)  $\vec{a} = i - 2j + 3k$ ,  $\vec{b} = 2i + j - k$ ,  $\vec{c} = j + k$ .
- 5] Forces  $2i + 7j$ ,  $2i - 5j + 6k$ ,  $-i + 2j + k$ , act at a point P position vectors is  $4i - 3j - 2k$ . Find vector moment of the resultant of three forces acting at P about point Q whose position is  $6i + j - 3k$  .
- 6] Find volume of the parallelepiped where quaterminus edges are represented by  
i)  $\vec{a} = 2i + 3j + 4k$ ,  $\vec{b} = i + 2j - k$ ,  $\vec{c} = 3i - j + 2k$ .  
ii)  $\vec{a} = 2i - 3j + 4k$ ,  $\vec{b} = i + 2j - k$ ,  $\vec{c} = 2i - j + 2k$ .
- 7] Show that the vectors  $\vec{a} = -i - 2j + 4k$ ,  $\vec{b} = -2i + 4j - 2k$ ,  $\vec{c} = 4i - 2j - 2k$ . are coplanar.

## SECTION: D

### Solving Problems in Numerical Analysis

- 1] The population of a country in the decennial census was as under estimate population for year 1925.

X	1891	1901	1911	1921	1931
Y	46000	66000	81000	93000	101000

2] From the following table find the numbers of students who obtained less than 45 marks

X	40	50	60	70	80
Y	31	73	124	159	190

3] Evaluate by using Numerical Integration formula  $\int_0^2 \frac{dx}{x^3 - 2x - 5}$ .

4] Calculate the approximate value of  $\int_0^{1/2\pi} \sin x dx$ .

5] Compute an approximate value of the integration by the trapezoidal method  $\int_0^{\pi} \sin x dx$ .

6] *Solve by using Euler's method*

$$\frac{dx}{dt} = -2x, \text{ with initial condition } x(0)=1 \text{ for } 0 \leq t \leq 1, h=0.2$$