Registration No : | | | | | | | | | | |

Total number of pages : 02 **B.Tech.**
FESM6302

6th Semester Back Examination 2017-18
ADVANCE NUMERICAL METHODS
BRANCH : CHEM
Time : 3 Hours
Max Marks : 70
Q.CODE : C479

Answer Question No. 1 which is compulsory and any FIVE from the rest.
The figures in the right-hand margin indicate marks.
Assume suitable notations and any missing data wherever necessary.
Answer all parts of a question at a place.

Q1. **Answer the following questions :** **(2 x 10)**

(a) What is the central difference formula to find $f^{iii}(x)$, $f^{iv}(x)$.

(b) Explain piecewise interpolation.

(c) Find the value of $f^{ii}(0.5)$ of the following data

x	0.3	0.5	0.7	0.9
F(x)	0.15	0.185	0.267	0.314

(d) Explain Romberg integration.

(e) Define Rayleigh Quotient.

(f) What is shifted power method?

(g) What is discrete Fourier transform?

(h) Write Adams-bash forth predictor–corrector formula.

(i) Check the nature of the equation
$2U_{xx} + 5U_{xy} - 3U_{yy} + 4U_x + 5 = 0$

(j) Explain about standard five point formula with an example.

Q2. Using the following data, estimate the value of f(-0.5) & f(0.5) by piece wise cubic Hermite Interpolation. **(10)**

x	f(x)	$f^1(x)$
-1	1	-5
0	1	1
1	3	7

Q3. From the following table evaluate $f^1(3)$by Richardson's method. **(10)**

x	1	2	3	4	5	7
f(x)	1	16	81	256	625	2401

Q4. **(a)** Use the QR method to calculate the Eigen values of **(5)**

$$A = \begin{pmatrix} 5 & -2 \\ -2 & 8 \end{pmatrix}$$

(b) Find the smallest Eigen value of A= $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ by inverse power method. **(5)**

Q5. **(a)** Using Milne's predictor corrector method find y(0.8). **(5)**

Given that $\frac{dy}{dx} = y - x^2$

X	0	0.2	0.4	0.6
Y	1	1.12186	1.4282	1.7379

(b) Using Adam's predictor corrector method determine y(0.4) and y(0.5). Correct to 3 decimals given that $\frac{dy}{dx} = 0.5xy$ **(5)**

X	0	0.1	0.2	0.3
Y	1	1.0025	1.0101	1.0228

Q6. Using Crank-Nicholson's scheme, solve $u_{xx} = 16u_t$. **(10)**
Where 0<x<1, t>0.
Given u(x,0)=0, u(0,t)=0, u(1,t)=100t.
Compute u for two time steps in t direction taking h=1/4.

Q7. Solve $U_{xx} = U_t$ by Bender-Schmidt formula. **(10)**
Subject to U(x,0)=sin πx , where 0<x <1
U(0,t)=0
U(1,t)=t

Q8. **Write short notes on any TWO :** **(5 x 2)**

(a) Mixed-radix FFT
(b) Basic QR method
(c) Romberg Integration
(d) Fast Fourier Transform