

BACHELOR OF CIVIL ENGINEERING (PART TIME) EXAMINATION 2017 (Old)
(First Year, Second Semester)

SUBJECT : NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING

Time: Three Hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I	Marks										
Answer Question No.1 and any Two from the rest.												
1.	Answer any one question											
	a) Write a FORTRAN 77 program to estimate a value y at a point x from a given table of values of x and y by using n th order Lagrange interpolation polynomial.	10										
	b) Write a computer program in FORTRAN 77 using Secant method that finds a root of the equation $x^2 - 2x - 1 = 0$, with initial guess 2.00 and 3.00, using tolerance of 0.001.	10										
2.	a) Using Newton-Raphson method, using two iterations, determine the roots of the following non-linear simultaneous equations, close approximation to start with $x = 1.00$ and $y = 1.00$ $x^2 + y^2 = 5$ $x^2 - y^2 = 1$	12										
	b) Solve the following system of equations by simple Gauss elimination method. $2x + y + z = 7$ $4x + 2y + 3z = 4$ $x - y + z = 0$	8										
3.	a)) What is an initial-value problem ?	2										
	b) Using Runge-Kutta method of order four find y at $x = 0.2$ and 0.4 by solving $y' = x^2 + y^2$, $y(0) = 0.0$. Assume $h = 0.20$.	8										
	c) Explain Predictor – Corrector method for solving initial-value problem for the type $\frac{dy}{dx} = f(x,y)$ with initial condition $y = y_i$ at $x = x_i$.	6										
	d) Explain the limitations of using Newton-Raphson method.	4										
4.	a) Write an algorithm to find root of a non-linear equation $f(x) = 0$ using Bi-section method.	3										
	b) Using false-position method, using two iterations, find a root of the equation $\sin x - 2x + 1 = 0$, with the initial estimates of $x_1 = 0.00$ and $x_2 = 1.00$.	4										
	c) Using Newton-Raphson method, using two iterations, determine the root of the equation $f(x) = x^2 - 3x + 2$ in the vicinity of $x = 0.0$.	3										
	d) What is interpolation? Given a set of $n+1$ points, state the general form of n th degree Lagrange interpolation polynomial.	3										
	e) For the following table of values: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>1.0</td> <td>2.0</td> <td>3.0</td> <td>4.0</td> </tr> <tr> <td>$f(x)$</td> <td>1.000</td> <td>1.4142</td> <td>1.7321</td> <td>2.000</td> </tr> </table>	x	1.0	2.0	3.0	4.0	$f(x)$	1.000	1.4142	1.7321	2.000	7
x	1.0	2.0	3.0	4.0								
$f(x)$	1.000	1.4142	1.7321	2.000								
find $f(x)$ for $x = 2.5$ using Lagrange interpolation. What order of polynomial would you use in the above problem?												

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No. of Question	Answer <i>all</i> questions. PART – II	
1.(a)	Write the equivalent FORTRAN expression for the following arithmetic statement: $Y=c+d^k+e^x$	2
(b)	Write the equivalent arithmetic expression for the following FORTRAN statement: $Y=a^{**}b/c+d^{**}e*f-h/p*r+q$	2
(c)	What will be the printed output, at the end of the following program segment? <pre> m=-478 a=66.5 b=-.22E-02 WRITE(*,8) m,a,b 8 FORMAT(2X,I8,F8.2,E10.2) END </pre>	2
(d)	What will be the value of the variable n, at the end of the following program segment? <pre> n=1.0 x=10.0 y=x**2 n=n+(y/x) WRITE(*,*)n END </pre>	2
(e)	What will be the value of the variable n, at the end of the following program segment? <pre> X=0 DO I=1,6,3 Do J=2,3 X=X+1.0 END DO END DO WRITE (*,*) X END </pre>	2
2.	Write short notes on <u>any four</u> of the following. <ol style="list-style-type: none"> Different block if –statement. Function subprogram and subroutine subprogram Rules to be followed in written DO-Loop. Library function in FORTRAN Rules of writing FORTRAN program in a file. 	4x2

No. of Question		
3.	Answer any two Questions.	15x2=30
a)	i) Write a FORTRAN program to print ascending order form given input as N number integer. ii) Write step-wise Algorithm and draw the flow chart to find big number from given three integer number.	8 7
b)	i) Given integer number, write a FORTRAN program to find number is odd or even. ii) Write a FORTRAN program, to product of two Matrices [A] and [B], both of size (2x3) and (3X2) respectively and store the result in a separate matrix [C]. Implied do loop use for output matrices and format it.	7 8
c)	i) Write a FORTRAN program to the sum of following series for the first N terms, using function subprogram. $Y=1+ 2/2! + 3/3! +.....$ ii) Write a FORTRAN program to find the value of ${}^n C_r$, using subroutine subprogram.	8 7
d)	i) Given four-digit integer number, write a FORTRAN program to print it in reverse and also find sum of the digits. ii) Write a FORTRAN program to find out roots of given a quadratic equation.	8 7

10 part

2

2

2

2

2

4x2