EPH614S- Numerical Methods and Computer Programming

Subject Incharge: Dr. V. Sathana

2 marks

1. Define Eigen values.

2. State Gauss-jordan method.

3. What is principle of least squares?

4. State Newton-Raphson method.

5. Explain Trapezoidal rule.

6. What are the limitations of Euler's method?

7. What is 'C'?

8. Explain types of 'C' constant.

9. Explain Go To statement.

10. State specific uses for 'for' loop.

11. Define Eigen values.

12. State Gauss-jordan method.

13. What is principle of least squares?

14. State Newton-Raphson method.

15. Explain Trapezoidal rule.

16. What are the limitations of Euler's

17. What is 'C'?

18. Explain types of 'C' constant.

19. Explain Go To statement.

20. State specific uses for 'for' loop.

21. Mention any two properties of Eigen values.

22. What do you mean by eigenvectors of a matrix?

23. Write down Newton's backward difference interpolation formula for equal intervals.

24. Write the general formula for Newton-Raphson method.

25. State the composite trapezoidal rule for evaluating $\int_{x_0}^{x_0+nh} y\,dx$

26. State Simpson's three-eighths rule.

27. Explain floating point constant.

28. What do you mean by the order of evaluation in C?

29. Give an example for jumping statement.

30. What is the significance of Eof?

31. State Cayley-Hamilton theorem.

32. Define Eigen values.

33. What is principle of least squares?

34. Write the general formula for Newton-Raphson method.

35. State Simpson 3/8 rule.

36. What are the limitations of Runge-Kutta's method?

37. What is 'C'?

38. Explain data types and sizes.

39. What are the conditional control statements?

40. Mention the uses of 'while' loop.

41. State Gauss-elimination method.

42. Define Eigen vectors.

43. Write the modified Euler's method formula.

44. Write the general formula for Lagrange interpolation.

45. State trapezoidal rule.

46. What are the limitations of modified Euler's method? Write the general form of the function in C language.

47. Explain the types of 'C' constant.

48. What are the unconditional control statements?

49. Mention the uses of 'for' loop. State Cayley Hamilton theorem.

50. Solve by Gauss elimination method x-2y=0, 2x+y=5.

51. State Newton's forward interpolation formula.

52. Using Newton's method, find the root between 0 and 1 of $x3 = 6x - 4$.

53. State Simpson's 3/8 rule.

54. State Euler's formula. Define a data.

55. What is an operator?

56. Define a loop.

57. What is stack?

58. Write down Newton's backward interpolation formula for equal intervals.

59. Write the General formula for Newton-Raphson method.

60. State Trapezoidal rule.

61. Give the algorithm of third order Runge-kutta method.

62. What is a variable?

63. List the decision making statements.

64. Write the General form of the function in C language.

65. Give an example of declaration of a pointer variable.

66. Distinguish between print and printf.

67. Name the relational operators.

68. Mention the significance of linear interpolation.

69. What is iteration method?

70. State simpson's 1/3 rule.

71. Write the formula for Euer's method.

72. List the data types in C lauguage.

73. Give the general form of if----else statement.

74. Mention the categony of Functions.

75. Give an example of multidimensional arrays.

76. Distinguish between getc and getchar.

77. Write the general format of scanf.

78. What is interpolation?

79. State the linear interpolation formula.

80. What is numerical differentiation?

81. Evaluate the integral $\int_{-1}^{1} e^x dx$ using Simpson's 1/3 rule.

82. Define operators.

83. Write down the syntax of 'if-else' statement in C programming.

84. What is function?

85. Define the term variable in computer programming.

86. What is an input device?

87. Define the term error handling. What is interpolation?

88. Solve by Gauss elimination method x-2y=0, 2x+y=5.

89. State Newton's forward interpolation formula.

90. Using Euler's method fine $y(0.2)$, given $y' = x+y$, $y(0)=1$.

91. Define a string. What are data types? Give examples.

92. Define a loop.

93. What is a ladder?

5 marks

94. State and explain Gauss Elimination method.

95. Solve the following of equations by Gauss elimination method.
$$5x_1 - x_2 - 2x_3 = 142$$
$$x_1 - 3x_2 - x_3 = -30$$
$$2x_1 - x_2 - 3x_3 = 5$$

96. Compute the derivations by Newton Backward difference formula.

97. Using Newton's method, find the root between 0 & 1 of $x^3=6x-4$ correct to five decimal places.

98. Evaluate $\int dx/1+x^2 PP$ using Trapezoidal rule with $h=0.2$, hence obtain an approximate value of Π.

99. Derive simpson 1/3 rule.

100.   What are the types of 'C' language variables?

101.   Write one any 'C' program.

102.   Obtain the do-while loop.

103.   State and explain while loop.

104.   Find the characteristic equation of the matrix A$=$
$$\begin{pmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{pmatrix}$$

Hence find A^{-1}

105.   Solve the following system of equations by Gauss-Jordan elimination method:
$$10X_1 + X_2 - X_3 = 11.19$$
$$X_1 + 10X_2 + X_3 = 20.08$$
$$-X_1 + X_2 + 10X_3 = 35.61$$

106.   The population of a town in the census is as given in the data. Estimate the population in the Year 1996 using Newton's i) Forward interpolation and ii) Backward

interpolation formula:

Year (x)	1961	1971	1981	1991	2001
Population (in 1000's)	46	66	81	93	101

107.   Find the roots of the equation $X^4+12X+7=0$, lying between -2 and -3, correct to 4 places of decimals, using Newton-Rapshon method.   When a train is moving at 25 meters per sec, steam is shut off nd brakes are applied. The speed of the train in meters persecond after t seconds is given in the following table:

t	0	10	20	30	40	50	60
v	25.0	18.1	12.3	7.6	4.0	1.6	0

108.   Given that dy/dx= x-y/x+y, y (2)=1, compute Y (1.9) by using improved Euler's method and Y(1.8) by using modified Euler's method.

109.   Explain the structure of C program.

110.   Describe the operators in C.

111.   Describe for statement with an example.

112.   Explain formatted output with an example.

113.   State and explain Gauss-elimination method.

114.   Solve the following equations by Gauss Jordan method.
         3x+4y+5z=18, 2x-y+8z=13, 5x-2y+7z =20.

115.   Explain linear interpolation.

116.   Solve 3x-cosx-1=0 to 4-decimal places using Newton-Raphson method?

117.   Use the Trapezoidal rule with h= to calculate ∫0 to 1 f(x) dx- using the table term.

   X: 0.000   0.250   0.500   0.750   1.000
   f(x): 0.79788   0.77334   0.70413   0.60227   0.48394

118.   Derive Simpson 1/3 rule.

119.   What are the different operators using 'C' language?

120.   What are the different types of 'C' language variables.

121.   Obtain the 'while' and 'do-while' loop.

122.   Explain unconditional control statements with suitable examples?

123.   State and explain Gauss Jordan method.

124.   Solve the following equations by Gauss-elimination method.

3x-y+2z=12, x+2y+3z=11, 2x-2y-z =2.

125.   Compute the derivations by Newton forward difference formula.

126.   Solve 3x-cosx-1=0 to 4-decimal places using Newton-Raphson method?

127.   Use the Trapezoidal rule with h=1/2, to calculate ∫f(x) dx- using the table term.

   X: 0.000   0.250   0.500   0.750   1.000

   f(x): 0.79788   0.77334   0.70413   0.60227   0.48394

128.   Derive Simpson 3/8 rule.

129.   What are the different types of 'C' language variables?

130.   What are the different operators using 'C' language?

131.   Obtain the 'for' and 'nested for' loop.

132.   State and explain while loop.

133.   Bring out the difference between the direct and iterative method of solving
        equations.

134.   Find the eigen value and eigen vector of the given matrix A.

135.   Solve for a positive root of the equation $x4 - x -10 = 0$ using Newton – Raphson
        method.

136.   Find a polynomial for the following data by Newton's backward Formula.

137.   Using Trapezoidal rule evaluate

138.   Using Runge- Kutta method of fourth order solve
        given $y(0)=1$ at $x=0.2$.

139.   Discuss the features of C language.

140.   Explain Perecedence and order of evaluation.

141.   Write a note on the user defined functions in C language.

142.   Write a program in C to print the numbers from 4 to 9 and their
        squares.

143.   Input three positive integers representing the side of a triangle and determine
        whether they form a valid triangle through a C- Programme.

144.   Explain about 'Do – while loop' and break and continue.

145.   Evaluate – dx/1+x2 using Trapezoidal rule with h=0.2.Hence obtain an
        approximate value of Л.

146.   Given y1=-y and y(0)=1,determine the values of y at x=(0,0) (0,0) by Euler method.

147.   Explain the external variables with an example.

148.   Describe Multidimensional arrays with an example.

149.   Describe the four basic data types.

150.   Explain do whole –break statement with an example.

151.   Write about the basic scanf conversions.

152.   Write a note on 'file access'.

153.   Explain lagrauge's interpolation formula for unequal intervals.

154.   Solve the system of equations by Gaues – Jordan method. x+2y+z=3

155.   Evaluate x4 2x+3y+3z=10 3x-y+2z=13

156.   Pdx by using simpson's 1/3 rule

157.   Apply the fouth order Runge - kutfa method to find y(0.2) given that y1P=x+y,y(0)=1

158.   Explain the precedence of arithmetic operators.

159.   Explain continue – go to statement with an example.

160.   Describe the header files and static variables.

161.   Explain pointers and arrays with an example.

162.   Explain formatted input with an example.

163.   Describe error handling I/o operations. a) Explain how the Newton's interpolation formula is better than Lagrange formula?

164.   Find the positive root of f(x) = *2x3-3x-6=0* by Newton – Raphson method correct to five decimal places.

165.   Describe the Trapezoidal method of computing integrals.

166.   Describe the Simpson's method of computing integrals.

167.   Write short notes on precedence and order of evaluation.

168.   Describe the functions of the following statements with examples: do, while, else if

169.   Explain briefly about various function in C++ programming.

170.   Write a note on scope rules.

171.   Give an account on Variable length arguments

172. What is difference between input and output device? Explain the concept of formatted output. a) Bring out the difference between the direct and iterative method of solving equations.

173. Fine the inverse of the given matrix by Gauss-Jordan method

174. State and explain Lagrange interpolation formula.

175. Using Newton's method find the root between 0 and 1 of $x3=6x-4$.

176. Using Trapezoidal rule evaluate $\int_{-1}^{1} \frac{1}{1+x^2}dx$

177. Use Euler's method to find $y(0.2)$ and $y(0.4)$given and $y(0)=1$.

178. Explain the identifiers and keywords in C language.

179. Explain the use of break and continue statement in loops with example.

180. Write a note on the user defined functions in C language.

181. Write a program in C to find the area and perimeter of a circle.

10 marks

182. State and explain Gauss-jordan elimination method and compute with solve the system of equation by Gauss-jordan method. $X+2y+z=3, 2x+3y+3z=10, 3x-y+2z=13$.

183. Briefly explain Newton-Raphson method.

184. Obtain Runge-kutta method.

185. Write the available control statement with examples in C language.

186. State loop statement and explain the various methods.

187. Find the eigenvalues and eigenvectors s of the matrix:

$$A = \begin{pmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$$

188. Apply Lagrange's interpolation formula to find f(x), if f (1) =2, f (2)=4, f (3) =8, f (4) =16 and f (7) =128. Hence find f (5) and f (6).

189. Solve the Simultaneous differential equations $dy/dx = 2y+z$; $dz /dx = y-3z$; $y(0)$ =0; $z(0) = 0.5$ For $y(0.1)$ and $z(0.1)$, using Runge-Kutta method of the fourth order.

190. Describe different types of Arrays with suitable examples.

191. Write a C program do find sum of individual digits for the given number n (n= 1, 2, 3) using While loop.

192. Solve the following equations using Gauss-elimination method.

5x-y-2z =142, x-3y-z = -30, 2x-y-3z=5.

193. Obtain Newton-forward and backward interpolation method.

194. Briefly explain Runge-Kutta method.

195. Write the history and features of C language.

196. Explain the various conditional control statements.

197. Solve the following equations using Gauss-elimination method.

2x+y+4z=12, 8x-3y+2z=20, 4x+11y-z=33.

198. Briefly explain Newton-Raphson method.

199. Obtain improved Euler's method.

200. Write the history and features of C language.

201. State continue and looping statement and explain the various methods.

202. By Gauss Jordan method solve the equations $x + y + z = 9$,

$2x - 3 y + 4 z = 13$ and $3x+4 y +5 z = 40$.

203. Find by Newton's method the real roots of the equation $3x=cosx+2$.

204. Given $y''+xy'+y = 0, y(0) = 1$ and $y'(0)=0$ find the value of $y(0.1)$ by Runge Kutta's fourth order method.

205. Write notes on arithmatic, relational and logical operators.

206. Explain the different types of loops in C with syntax and example. Solve the equation dyy1, (0) 1dx x y= =for y (0.1) and y (0.2) using Runge – kutta method of fourth order.

207. Evaluate ------ logex+dx using Trapezoidal and simpson's rule.

208. Explain arithmetic, relational and logical operators with an example.

209. Explain about standard C- library functions that assist the

210. programmer in handling input and output.

211. Describe pointers and function arguments with an example. Apply Gaues – Jordan method to find the solution of the following system.

10x+y+z=12

2x+10y+z=13

x+y+5z=7

212.   Compute y (0.3) given dy/dx+y+xy=0, y(0)=1 by taking h=0.1using Runge –
kulta method of fourth order.(correct to 4 decimala)

213.   Explain switch,while and for statements with an example.

214.   Write short notes on (i) external variables (ii) header files (iii) Static variables

215.   Write a program to read a character from keyboard and then prints it in reverse
case.[Upper case to lower case and viceversa]

216.   Apply Gauss-Jordan method of find the solution of the following system:

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$x + y + 5z = 7$$

217.   Using Euler's method, solve numerically the equation $y= x+y, y(0)=1$, for $x=0.0$
(0.2) (1.0).

218.   Explain the function of arithmetic, logical and relational operatorsin
programming.

219.   What is an array? Describe the functions of multidimensional arrays.

220.   What are the types of file access? Explain their functions with examples.

221.   By Gauss Jordan method find the inverse of the matrix $\begin{bmatrix} 4 & 1 & 2 \\ 2 & 3 & -1 \\ 1 & -2 & 2 \end{bmatrix}$.

222.   Find by Newton's method the real roots of the equation $3x=cosx+2$

223.   Using Runge- Kutta method of fourth order solve

$\dfrac{dy}{dx}=\dfrac{y^2-x^2}{y^2+x^2}$ given $y(0)=1$ at $x=0.2$

224.   Write notes on arithmatic, relational and logical operators.

225.   Explain in detail types of control statements in C language.