EX/CSE/T/215A/2017

**BCSE 2nd Year 1st Semester EXAMINATION 2017**

**Computer Organization**

Time : Three Hours Full Marks : 100

Answer any *five* questions

All parts of a question are to be answered together

1a) The value of a *float* type variable is represented using the single-precision 32-bit floating point format of IEEE-754 standard that uses 1 bit for sign, 8 bits for biased exponent and 23 bits for mantissa. A *float* type variable $X$ is assigned the decimal value of −14.25. The representation of $X$ in hexadecimal notation is

b) Consider a 16-bit floating number with 6-bit exponent (excess 31 format) 9-bit normalized mantissa. The base is of scale factor 2. Find A+B , A-B and represent the results in the above format, use truncation method of rounding.A = 0 100001 111101111 B = 0 011111 011011011
(Consider an implicit 1 to the left of normalized mantissa as in IEEE format.) (10 + 10)

2a) Instruction execution in a processor is divided into 5 stages, ***Instruction Fetch*** (IF), ***Instruction Decode*** (ID), ***Operand Fetch*** (OF), ***Execution*** (EX) and ***Write Back*** (WB). These five stages take 5, 4, 20, 10 and 3 nanoseconds respectively.The pipeline implementation of the processor requires buffering between the stages with a delay of 2 nanoseconds. Two pipeline implementations are contemplated:

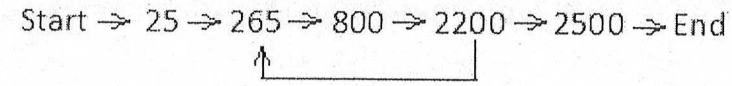
(i) A naïve pipeline implementation (NP) with 5stages

(ii) An efficient pipeline (EP) with 6 stages where the stage OF is divided into two stages OF1 and OF2 with execution times 12 and 8 nanoseconds respectively.

Find the speedup achieved by EP over NP in executing 20 independent instructions with no hazards.

b) Consider an instruction pipeline with five stages without any branch prediction: Fetch Instruction (FI), Decode Instruction (DI), Fetch Operand (FO), Execute Instruction (EI) and Write Operand (WO). The stage delays for FI, DI, FO, EI and WO are 6 ns, 7 ns, 10 ns, 8 ns and 8 ns, respectively. There are intermediate storage buffers after each stage and the delay of each buffer is 2ns. A program consisting of 14 instructions I1, I2, I3, ..., I14 is executed in this pipelined processor. Instruction I6 is the only branch instruction and its branch target is I12. If the branch is taken during the execution of this program, find the time (in ns) needed to complete the program. (10 + 10)

3. A typical computer system has 32K main memory and 2K fully associative cache memory. The cache block size is 128 bytes. (i) How many bits are there in the TAG field ? (ii) Find the successful hit ratio for the following program structure where LRU replacement policy is used. The program starts from address 25 and continues to address 2500 with a loop between 265 to 2200, which loops 10 times. (20)

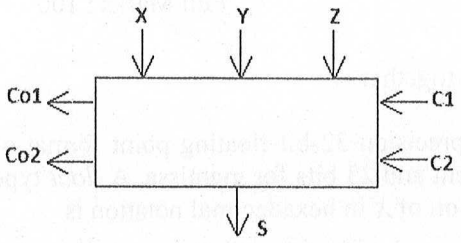



4a) Describe Booth's modified algorithm and show that just N/2 partial products are required to multiply two N bit binary numbers. Illustrate the algorithm with the example of multiplication of +29 and -31.

b) How associative memory differs from conventional memory ? Explain with neat diagram the organization of associative memory. Describe the operation of match logic used in associative memory. (10+ 10)

5a) Suggest a situation where it would be advantageous to define a virtual memory that may be smaller than available physical memory. Similarly suggest a situation where use of cache memory will be found detrimental.

b) Design a device capable of adding three binary bits simultaneously. The device has five inputs as shown below.




X, Y and Z are three arguments, C1 is the carry-in from the preceding stage, C2 is the carry-in from prior to preceding stage. The output S designates the sum, C01 is the carry-out for the succeeding stage and C02 is the carry-out for the next-to-the succeeding stage, Drive the minimal Boolean functions for each of the three outputs S, C01 and C02. Also calculate the delay involved in your design. (5 + 15)

6a) Draw the CSA organization to add 9 signed nos. of 6 bit each having CLA at last stage. Count the minimum no. of full adders, basic adders and CLCs required for your design. Also calculate the gate delay in your addition process.

b) The memory unit of a computer has 256K words of 32 bit each. The computer has an instruction format with four fields : an opcode field, a mode field to specify one of seven addressing modes, a register address field to specify one of 25 processor registers and memory address. Specify the instruction format and the no. of bits in each field, if each instruction is one memory word long. Also find the total no. of operations that can be performed by the ALU. (10+10)

7a) In a certain computer system with cache memory 550 micro sec. is the access time for cache miss and 50 micro sec. is the access time for cache hit. Find the percentage decrease in the effective access time if the hit ratio is increased from 75% to 95%.

b) Consider a 2-way set associative cache with 256 blocks and uses LRU replacement. Initially the cache is empty. Conflict misses are those which occur due the contention of multiple blocks for the same cache set. Compulsory misses occur due to first time access to the block. The following sequence of memory access is repeated 10 times. { 0,128,256,128,0,128,256,128,1,129,257,129,1,129,257,129 }
Find the number of conflict misses as well as compulsory misses. (10+10)

8. Write short notes on :

i) Belady's Anomally ii) Virtual memory

iii) Carry Look Ahead adder iv) Series parallel adder (4x5 = 20)

**BACHELOR OF COMPUTER SC. & ENGINEERING EXAMINATION, 2018**

**(2nd Year, 1st Semester)**

**DATA STRUCTURES AND ALGORITHMS**

**Time : Three hours** **Full Marks : 100**

Answer question no. 1 and any *four* from the rest.

1. (a) What do you mean by Transitive Closure Matrix? Explain with an example. 5

(b) What is Load Factor in the context of Hashing? What is its significance? 3

(c) What do you mean by a sentinel? Explain when you use sentinels. 2

(d) Comment on the correctness of the recursive function given below:

```
int R1 (int n) {
        if (n == 0)
        return 1;
        else return (R1(n-2) * R1(n-3));
}
```

4

(e) Show how the following elements will be inserted in the given order in a Binary Search Tree:

K M E T C Y N F A Z

2

(f) Show how the following array will be sorted in *increasing order* using Bucket Sort algorithm:

6 4 1 3 6 4 1 3 7 5 1 3 7 5 8 9

4

2. Define the ADT for Priority Queue.
What are the possible implementations of Priority Queue based on arrays and based on linked list? Explain the implementations and compare their time complexities for different queue operations.

4+6+6+4=20

3. A rat has entered in a checkerboard maze through one corner, where the white boxes are open and black boxes represent obstacles. Develop an algorithm by which the rat can exit the maze though the opposite corner (these two corner boxes are open). Clearly explain the representation of the maze and any specific data structure you have used for the algorithm.

20

4. A text file MARKS.TXT, where each line contains the roll number, name of student and his/her aggregate marks obtained in a certain examination is given. You are asked to write a C program to store the merit list in another file MERIT.TXT, where the names of the students are ordered according to the aggregate marks obtained. Each line of this file contains the merit position and the name of the corresponding student. Select a suitable Data Structure for the problem and write a commented C program for producing the merit list. List all the assumptions you have made.

   20

5. Write a recursive algorithm to find whether a given binary tree is a Binary Search Tree. What is the type of recursion you have used? Explain.
   What are the problems of Binary Search Tree regarding the complexity of search and insertion? How can you solve the problem by balancing the tree? Explain.
   Explain with examples how an element can be inserted in such a balanced tree. Are there any special cases to be handled in such insertion algorithm? Explain with examples.

   5+3+2+3+4+3 = 20

6. What do you mean by Hashing? What is the complexity of insertion, deletion and search in a hash table? Explain in detail the coalesced chaining method of hashing.
   What is Bucket Hashing? Explain how it is used to store records in a hard disk. What is the basic parameter on which the efficiency of disk based Bucket hashing depends?

   4+2+8+2+3+1=20

7. A number of cities are connected by a road network. You are to find the shortest route from a designated city to all other cities. Explain how to model the problem using a suitable data structure. Explain how the data structure is implemented in C language.
   Give an algorithm to solve the problem to output the distance to be travelled for a destination city as well as the actual route. Find the time complexity of your algorithm.

   2+4+6+2+6=20

8. Write the following functions in C with proper comments. Define the data types you have used:
   a. Your friend has implemented a data structure for Binary Search Tree of integers. S/he has given you the function templates to initialize a BST and insert an integer in the BST. Write a C function to sort a given list of integers using the above two functions.
   b. To check whether an array in sorted in increasing or decreasing order.
   c. To rotate right a binary tree around its root.
   d. To compute a Minimum Cost Spanning Tree of a Weighted Graph.

   6+6+2+6=20

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# BACHELOR OF COMPUTER SC. ENGG. EXAMINATION, 2018

(2nd Year, 1st Semester)

**Digital Circuits**

Time : Three hours | Full Marks : 100

Answer any ***five*** questions

(a) What is semiconductor? In the light of energy band theory, explain semiconductor, metal, insulator.

(b) Explain Ideal diode equation. Let $V_\sigma$ =0.75V is the voltage across a diode when it is in saturation. Let us consider that the current which is 1% of the current corresponding to $V_\sigma$, the diode becomes just forward biased at the corresponding voltage be $V_\gamma$. Calculate $V_\gamma$ at room temperature where nkT/q=0.026V at room temperature T, k= Boltzman constant, n= emission coefficient.

(c) What is σ for transistor? How does it vary in active and saturation region?

(d) How does the transistor act as a switch? Explain CE, CC and CB mode for the transistor to work as switch. Which mode is better for switch and why?

5+7+2+6

(a) Compare bipolar transistor versus Junction field effect transistor.

(b) How do you compare FET, enhancement type NMOS, depletion type NMOS with respect to operating point?

(c) How is CMOS working as a switch?

(d) Prove that the ratio of impedances $Z_{pu}$ and $Z_{pd}$ of the pull-up to pull-down transistors of an nMOS inverter is 4 :1.

3+5+3+9

(a) What is the disadvantage of Diode logic?

(b) Consider the following circuit (Fig. 1). The voltage across the diode is 0.75 when forward biased. Deduce the voltage at C for 4 different combinations of A and B and each such combination for three different values of $R_L$ – (i) α (infinity), (ii) 500 Ω and (iii) 1 KΩ. From the results conclude the logic performed by it.

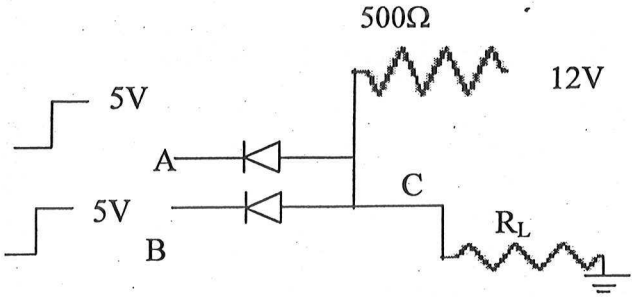


Fig. 1

(c) Explain the operation of a DCTL gate. Explain the current hogging problem.

2+10+8

(a) Draw the two inputs AND gate using RTL. Explain its operation.

(b) What is the output of parallelization of RTL gates.

(c) Consider the circuit (Fig.2) in next page. The voltage across the diode is 0.75V when forward biased. The base emitter junction voltage of the transistor during saturation and active mode are 0.75V and 0.70 respectively. Deduce the voltages at Base and Collector of the transistor for 2 different combinations of Input and each such combination for four different values of $R_L$ – (i) α (infinity), (ii) 100 Ω (iii) 500Ω and (iii) 1 KΩ. From the results conclude the logic performed by it.

(d) In Fig.2, what will be the base voltages for two different combinations at input, if -12V is changed to +5V.

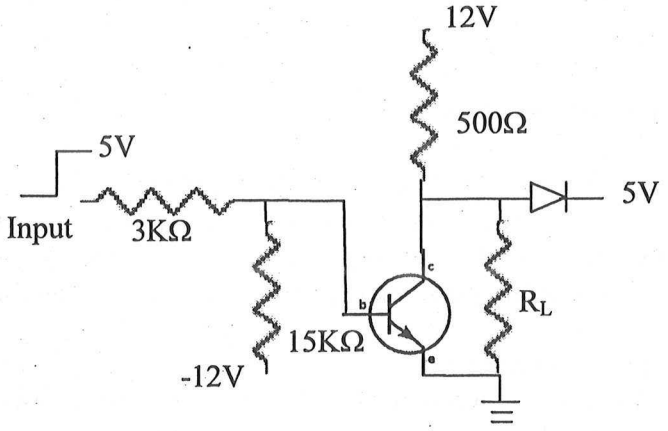


Fig. 2

5+2+9+4

5. (a) Draw an IIL gate. What is the advantage of IIL gate? Why is IIL gate called merged-transistor logic?
   (e) With the help of a circuit diagram explain the operation of a DTL gate.
   (f) How is the circuit of DTL modified for integrated version? What are its advantages over the discrete version?

6+7+7

6. (a) Draw HTL gate. What is its advantage over DTL?
   (b) Calculate the number of fan-out of HTL gate.
   (c) Explain the operation of a TTL NAND gate. Compare DTL and TTL.
   (d) Explain - why is TTL having more speed?

6+4+7+3

7. (a) What is the common problem of RTL, DTL and TTL gates?
   (b) Explain the operation of an ECL gate. What is its advantage?
   (c) Implement a four-word, four-bit ROM using diode and resistances for the following encoder with I1,I2,I3,I4 as inputs and Z1,Z2,Z3,Z4 as outputs.

| I1 | I2 | I3 | I4 | Z1 | Z2 | Z3 | Z4 |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |

   (d). With reference 7(c), show the implementation of Z3 using transistor and resistance.

3+6+8+3

8. (a) What is the use of Sample-Hold circuit?
   (b) Design a 3-bit successive approximation A/D converter. Explain its operation.
   (c) Explain the operation of a R-2R ladder type DAC.

3+10+7

# B.E. COMPUTER SCIENCE AND ENGINEERING SECOND YEAR FIRST SEMESTER - 2018

## SUBJECT: ELECTRICAL TECHNOLOGY

**Time : Three hours** **Full Marks 100**

**No. of questions**

## Part - I

Answer any *two* (2×20 = 40) questions

Use Separate Answer scripts for each Group.

Marks

| | | | |
|---|---|---|---|
| 1. | (a) | How can the open circuit characteristic of a separately excited generator be determined experimentally? What is the effect of speed on this characteristic? | 6 |
| | (b) | A separately excited DC machine with an armature resistance of 0.5Ω, supplies 5kW at 220V, when run as a generator at a speed of 1000rpm. What would be the speed of the machine when run as a motor, if it is fed by the same voltage, draws same current but the flux/pole is increased by 15%? | 6 |
| | (c) | Explain how the speed of a shunt motor can be varied above and below the normal speed. | 8 |
| 2. | (a) | Explain how a three phase alternator can be synchronized to an existing grid. What are the preconditions for safe synchronization? | 6 |
| | (b) | Derive and draw the torque-angle characteristics of a synchronous motor. Mark various regions of operation. | 7 |
| | (c) | A three phase synchronous generator connected to 22kV grid, has a synchronous reactance of 5Ω per phase. It is delivering 12MW and 5MVAr to the system. Calculate (i) Phase angle of the current with respect to grid voltage (ii) Power and torque angle (iii) generated emf. | 7 |
| 3. | (a) | Derive the speed-torque characteristics of a DC series motor. Why these motors are popular in traction application? | 7 |
| | (b) | Derive and plot the external characteristics of a DC shunt generator. | 6 |
| | (c) | Using proper phasor diagrams, show that power factor of synchronous motor for a given power and voltage, can be controlled by controlling the excitation. | 7 |

## PART II (60 Marks)

**Answer any three questions (20× 3)**

1. (a) Distinguish between Electric Circuit and Magnetic circuit. Define eddy current. How we can minimize Hysteresis loss and eddy current loss. Derive the relation between Magnetic flux and Ampere turns. How Hysteresis loop is formed with the alternating current supply. (3+2+4+3+4)
   (b) Determine the hysteresis loss in an iron core weighing 50kg having a density of $7.8 \times 10^{-3} kg/m^3$ when the area of the hysteresis loop is $150cm^2$, frequency is 50Hz and scales on x and y axes are : 1cm=30AT/cm and 1cm=$0.2wb/m^2$. (4)

2. (a) Derive $V_{rms}$, $V_{avg}$, Form factor and Peak factor for a Triangular wave form. Draw the Power triangle and write the relation among the sides of powers triangle. (2+2+2+2+2+3)
   (b) 240V, 50Hz single phase supply gives 5A to a series circuit consisting of resistance and a coil. Voltage across the Resistance is 120V and Coil is 200V. Calculate
   (i) R, $X_L$ and Z.
   (ii) Power absorbed by the coil.
   (iii) Power factor of the input current. (3+2+2)

3. (a) Write the Two Wattmeter method to measure the balanced three phase power with suitable circuit diagram and phasor diagram and mention when total power consumed by the two wattmeters is zero. Prove $E_L=\sqrt{3}E_{Ph}$. Where $E_L$= Line voltage and $E_{ph}$= Phase Voltage. (8+4+3)
   (b) Three equal star connected inductor takes 8kW at a power factor 0.8 when connected across a 460V, 3-phase, 3-wire supply. Find the circuit constant of the load per phase. (5)

4. (a) Derive the EMF equation of single phase transformer. Why Open Circuit test is performed on Low Voltage side in case of single phase transformer? Draw the Phasor diagram on load in case of single phase transformer. (7+3+5)
   (b) A single phase transformer with a ratio of 440/110V takes a no-load current of 5A at 0.2 power factor lagging. If the secondary supplies a current of 120A at a power factor of 0.8 power lagging. Estimate the current taken by the primary. (5)

5. Write short note any four of the following. (5+5+5+5)
   (a) Short Circuit test of Single Phase transformer.
   (b) Working Principle of 3-phase Induction motor.
   (c) Equivalent Circuit of Single Phase transformer.
   (d) Power Factor calculation in case of Two Wattmeter method.
   (e) Series Resonance in case of RLC circuit.
   (f) Core loss separation process.

Ref. No.: Ex/CSE/MATH/T/211A/2018

# B.CSE, 2ND YR. 1ST SEMS EXAM, 2018

## MATHEMATICS - IV

Full Marks:100 Time: Three Hours

Answer question number 1 and any six questions from the rest.

1. Find the radius of convergence of the following series. (4)
   (a) $\sum_{n=1}^{n=\infty} \frac{(ax+b)^n}{c^n}$, where $a$, $b$ and $c$ are real numbers and $c \neq 0$.
   (b) $\sum_{n=1}^{\infty} \frac{2^{2n}x^n}{n^2}$

2. Solve Hermite differential equation

$$y'' - 2xy' + 2\alpha y = 0,$$

   where $\alpha$ is a constant.
   (a) Find two linearly independent solutions near $x = 0$. Write first three terms in each series. (8)
   (b) Find radius of convergence for both the series. (2)
   (c) Show that there is a polynomial solution of degree $n$, in case $\alpha = n$, a non-negative integer. (2)
   (d) Find those particular polynomials of degree $n$ denoted by $H_n(x)$ for $n = 0, 1, 2, 3$, such that coefficient of $x^n$ in $H_n(x)$ is equal to $2^n$. (4)

3. (a) Classify the singularity of the differential equation $xy'' - y' + 4x^3y = 0$. Find Frobenius series solution about the singular point of the equation. Write first three non-zero terms in each series. Also express the solution in terms of elementary functions. (10)
   (b) Find general solution of the Cauchy-Euler equation $9x^2y'' + 3xy' + y = 0$ (6)

4. (a) Find general solution of the differential equation (8)

$$y'' + y' - 6y = 10e^{2x} - 18e^{3x} - 6x - 11.$$

   (b) Use the method of variation of parameters to find a particular integral of the differential equation (8)

$$y'' + 6y' + 9y = \frac{e^{-3x}}{x^3}.$$

5. (a) Prove that (10)

$$\int_{-1}^{1} P_m(x)P_n(x)dx = \begin{cases} 0 & ,m \neq n \\ \frac{2}{2n+1} & ,m = n \end{cases}$$

where $P_n(x)$ is the Legendra polynomial of degree n.

(b) Write generating function of Legendre ploynomials. Use that function to prove (6)

i. $P_n(-x) = (-1)^n P_n(x)$

ii. $P_{2n}(0) = (-1)^n \frac{1.3.5.....(2n-1)}{2^n n!}$

6. (a) State the orthogonality property of Chebyshev ploynomials of first kind. Plot first five Tchebyshev polynomials of first kind. Find the Tchebyshev series expansion of $sin(cos^{-1}x)$. Write first five terms of the series. (10)

(b) Prove that $T_n(x) = \cos(ncos^{-1}x)$ is a polynomial of degree $n$. Derive a recursion relation on $T_n(x)$. (6)

7. (a) Show that $f(z) = \bar{z}$ is nowhere differentiable. (4)

(b) Show that the function $f(z) = (x^2 + y) + i(y^2 - x)$ is not analytic at any point. (4)

(c) Calculate $\int_\gamma |z|^2 dz$, where $\gamma$ denotes the contour that goes (6)
(i) vertically from 0 to $i$, then horizontally from $i$ to $1 + i$,
(ii) horizontally from 0 to 1, then vertically from 1 to $1 + i$.

(d) Write all values of $i^i$ in the form $a + ib$. (2)

8. (a) Use Cauchy integral formula to show that (4)

$$\int_\gamma |z+1|^2 dz = 2\pi i, \quad \text{where} \quad \gamma(t) = e^{it}, 0 \leq t \leq 2\pi$$

(b) Find Laurent series expansions of the following functions around $z = 0$ (8)
(i) $\frac{1}{z(1-z)}$ valid for $0 < |z| < 1$,
(ii) $z^3 e^{1/z}$ valid for $|z| > 0$.

(c) Consider a circle of radius 1, and let $Q_1, Q_2, ....., Q_n$ be the vertices of a regular n-gon inscribed in a circle. Join $Q_1$ to $Q_2, Q_3, .....Q_n$ by segments of lengths $\lambda_2, \lambda_3, .....\lambda_n$. Show that (4)

$$\prod_{i=2}^{n} \lambda_i = n.$$

9. (a) Find the poles and their orders of the functions (4)
(i) $\frac{1}{z^4+16}$ (ii) $\frac{1}{z^2+z-1}$

(b) Describe the type of singularity at $z = 0$ of each of the following functions (4)
(i) $z^3 \sin^2 z$ (ii) $\frac{\cos z - 1}{z^2}$

(c) By considering the function $f(z) = \frac{e^{iz}}{z^2+4z+5}$ integrated around suitable contour , find (8)

$$\int_{-\infty}^{\infty} \frac{\sin x}{x^2+4x+5} dx.$$

10. (a) Expand $f(x) = x^2, 0 < x < 2\pi$ in a Fourier series if the period of $f(x)$ is $2\pi$. Hence find the value of $\sum_{n=1}^{\infty} \frac{1}{n^2}$. (10)

(b) Find Fourier series expansion of a function of period 10, given by (6)

$$f(x) = \begin{cases} 0, & -5 < x < 0 \\ 3, & 0 < x < 5 \end{cases}$$

# B.E. Computer Science & Engineering Examination 2018
## Second year First Semester

## NUMERICAL METHODS

Time : 3 hours. Full Marks : 100

**Answer question no.1 and any 4 from the rest.**
**All parts of same question should be answered together.**

1. a) Define round-off and truncation errors. 2
   b) Draw a comparison between regula falsi method and secant method. 3
   c) Show that Newton- Raphson formulato find $\sqrt{a}$, $a>0$, can be expressed in the form
   $$x_{n+1} = [\, x_n + a/x_n \,]/2$$
   d) Write down the expressions for truncation errors for Trapezoidal method, Simpson's ⅓ rule and Simpson's ⅜ rule. 4
   e) Define $\Delta$, and E. Hence prove that 3
   $$\Delta - \nabla = -\Delta\nabla$$
   f) Why Gauss-Seidel method is better than Jacobi's method for solution of linear simultaneous equations? 3
   g) What is limitation of Jacobi's method for finding the eigenvalues of a symmetric matrix? 1
   h) Modify Newton- Raphson iteration formula for solution of a nonlinear equation with multiple roots at a point. 2

2. a) Describe secant method for solution of non-linear equations. 2
   b) Derive the order of convergence for the above method. 4
   c) Solve the following equation using Newton- Raphson method. 5+5
   $$x \log_{10} x - 1.2 = 0$$
   Solution is required to be corrected upto 4 decimal places. Choose your own initial approximation. 6

3. a) Discuss Jacobi's iterative method for finding the roots of linear simultaneous equations. 6
   b) Write down the method in matrix notation. 4
   c) Hence find the convergence of the method. 4
   d) Solve the following system of equations by LU decomposition method. 6

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

4. a) Define the terms eigenvalue and eigenvector. 2

b) Find all the eigenpairs ( $\lambda_i$ , $X_i$ ) of the following matrix by Jacobi's method.

$$A = \begin{matrix} 3 & 2 & 2 \\ 2 & 5 & 2 \\ 2 & 2 & 3 \end{matrix}$$ 8

c) Given the following table of values:

| x | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|---|---|---|---|---|---|---|---|
| y | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

Scale the x-values so that their mean becomes zero.
Obtain a least squares fit of the following form to the scaled tabular values.

$$y = aX^2 + bX + c$$

Finally, restore the unscaled form of the fitted polynomial. 10

5. a) Discuss Adams-Bashforth method for solution of ordinary differential equations for initial value problem. 10

c) Solve the following initial value problem using Euler's method. 10

$$\frac{dy}{dx} = 3(x + y) \text{ with } y(0) = 1$$

Solution is required over [ 0,1 ] with $h = 0.1$.
Calculate the percentage error with the exact solution

$$y = (4e^{3x} - 3x - 1)/3$$

6. a) Derive Gauss central difference interpolation formulae. 4+4

b) The velocity '$v$' of a particle at a distance '$s$' from a point on its path is given in the following table :

| '$s$' in metres | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|
| '$v$' in m/sec | 47 | 58 | 64 | 65 | 61 | 52 | 38 |

Estimate the time taken to travel 60 metres using Simpson's ⅓ rule. 6

c) Find the inverse of the following matrix using Gauss-Jordan method. 6

$$A = \begin{matrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{matrix}$$

7. a) Discuss Romberg's method for evaluating the integral of the following form.

$$\int_b^1 f(x\}dx$$

10

b) Evaluate the following integral using Gauss Quadrature formula.
Take n = 2, 3 and calculate the errors with respect to the true value.

$$\int_0^1 (1/(1+x^2))\ dx$$

10

8. a) Discuss basic principles of Spline interpolation method. 10

b) Describe Bairstow's method for finding complex roots of a polynomial equation. 10

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