

PURBANCHAL UNIVERSITY
2018

B.E. (Computer) / Fifth Semester

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG371CO: Algorithm Analysis & Design (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

$8 \times 10 = 80$

1. ✓ Compare optimization problems and decision problems.

Elaborate on Asymptotic Notations with examples. **4+6**

2. ✓ Using the step count method analyze the time complexity when two $m \times n$ matrices are added. Derive Big Oh notation for given relation: $T(n)=2T(n/2)+3n^2$, $T(1)=1$ and $n=2^k$ **4+6**

3. How divide and conquer method is used to solve a problem?

✓ Explain convex hull problem using Divide and Conquer method. **4+6**

4. Write down general method of greedy technique. Find optimal schedules for following tasks with given deadlines and penalties in terms of weight. **4+6**

Task	1	2	3	4	5	6
W_i	20	15	25	10	5	30
d_i	2	4	3	1	5	6

5. ✓ Differentiate between Divide and conquer method and Dynamic Programming method. Explain a multistage graph problem based on dynamic programming with example. **4+6**

6. What is all pair shortest path problem? Solve TSP problem to find optimal path using Dynamic Programming method for a graph with cost matrix as follow: **4+6**

Contd. ...

(2)

$$\begin{bmatrix} 0 & 20 & 15 & 10 \\ 6 & 0 & 2 & 6 \\ 5 & 12 & 0 & 15 \\ 7 & 10 & 9 & 0 \end{bmatrix}$$

7. Write down solution state space tree for 4 queen problem with explicit and implicit constraints to solve using backtracking method. 4+6
8. Define NP hard and NP complete. Show that CLIQUE is NP complete. 5+5
9. Write down steps of least cost search method to solve TSP problem. Solve O/I Knapsack problem using Branch and Bounding method for item: $\langle 11, 12, 13 \rangle$, $\langle w_1, w_2, w_3 \rangle : \langle 5, 4, 3 \rangle$ and $\langle v_1, v_2, v_3 \rangle : \langle 6, 5, 4 \rangle$ 4+6

PURBANCHAL UNIVERSITY
2016

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

BEG373CO: Operating System (New Course)

Full Marks: 80 /Pass Marks: 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

$8 \times 10 = 80$

What is an operating system? Discuss briefly about the evolution of operating system.

(A)

2+8

Define process and its different states. What are the various operations on a semaphore? Solve the produce-consumer problem using semaphore.

2+4+4

Compute average waiting times using FCFS, Priority (lowest no. represents highest priority) and Round Robin (quantum= 1ms) scheduling algorithm for the following set of processes. Assume that all processes have arrived at time 0 in the order P1, P2, P3, P4 and P5.

3+3+4

Process	Burst Time(ms)	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

(C)

What are the necessary conditions for a deadlock? Briefly explain "Banker's Algorithm".

4+6

Consider that there are total 10 magnetic tapes. There are four processes in the system, in which process p1 may need maximum of 4-tapes, p2 may need maximum of 3, p3 may need maximum of 5 and p4 may need maximum of 7 tape drives. The matrix is as follows:

10

Contd. ...

PURBANCHAL UNIVERSITY
2016

B.E. (Computer)/Fifth Semester

Time: 03:00 hrs.

BEG371CO: Algorithm Analysis & Design (New Course)

Full Marks: 80 /Pass Marks: 32

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

$8 \times 10 = 80$

1. What do you mean by asymptotic notation? Define and explain the notation Big Oh, theta and omega notation. Find the best case, worst case and average case running time for Binary Search algorithm.

(4)

1+5+4

2. Define multistage graph. Explain knapsack problem in context of Backtracking.

(4)

2+8

3. Define greedy paradigm. Explain the concept of job sequencing with illustration. You have given 5 jobs with profit "pi" and deadline "di" as:

job = {1,2,3,4,5}

pi = {20,10,5,15,1}

di = {2,1,3,2,3}

(8)

Find the optimal job list that can be executed in sequence with their deadlines so as to maximize the profits.

2+8

4. Discuss algorithm analysis. Explain time complexity and space complexity.

(2)

3+7

5. What is graph? Explain shortest path algorithm and its application with Dijkstra's Algorithm.

(4)

2+8

6. What is Divide and Conquer technique? Using this technique, write an algorithm of quick sort and then analyze it.

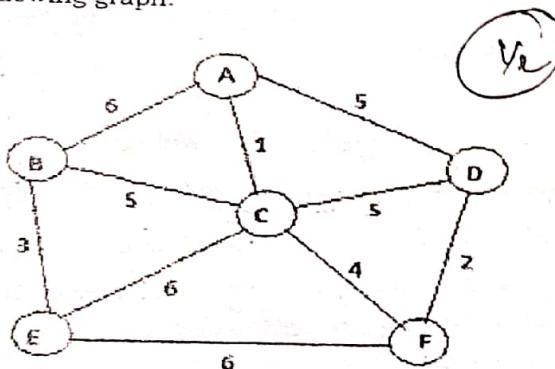
(3)

3+7

(2)

Sketch the Prim's algorithm for computing Minimum Spanning Tree (MST) of a graph and analyze its complexity. Find the MST for the following graph.

10



Explain about Class P, Class NP and NP complete with suitable example.

10

What is the concept of dynamic Programming? Find the longest common subsequence (LCS) between "XMJYAUZ" and "MZJAWXU".

3+7

Write short notes on:

5+5

- (a) Travelling Salesman problem
- (b) Convex Hull

4

(2)

Process	Max. Need	Allocated
P1	4	2
P2	3	2
P3	5	3
P4	7	1

2

Find the safe sequence if the system is in safe state.

4

What are the advantages of dynamic memory partitioning over fixed memory partitioning. Use LRU page replacement algorithm in the following reference string having three frames available calculate the no. of page faults:

0 1 2 3 0 1 2 3 0 1 2 3 4 5 6 7

5

Discuss disk scheduling algorithm in brief.

3

- 8(a) Define soft real time and firm real time.

4

- (b) Why is Android Operating System popular? Discuss.

9. Write short notes on any TWO:

5

- (a) Classical IPC Problem-Dining Philosopher
- (b) DMA
- (c) Process Control Block (PBC)

3

PURBANCHAL UNIVERSITY

2015

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG371CO: Algorithm Analysis & Design (New Course)

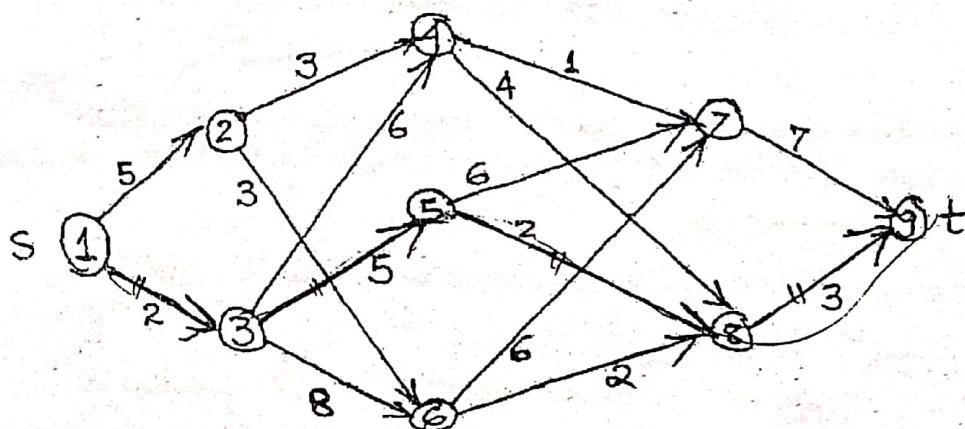
Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

$8 \times 10 = 80$

- 1(a) Describe briefly how the divide-and-conquer strategy is used for designing efficient algorithms. 4
- (b) Using divide-and conquer strategy, design an algorithm for binary search and compute its time complexity for the worst case. 6
- 2(a) What is dynamic programming? How does it differ from greedy strategy? 2+2
- (b) Find minimum-cost path from s to t in the given multistage graph using either forward or backward approach. 6



- 3(a) Give the algorithm for greedy strategies for the Knapsack problem. 4
- (b) Using greedy strategy, find an optimal solution to the knapsack instance $n=7$, $m=15$, $(p_1, p_2, \dots, p_7) = (10, 5, 15, 7, 6, 18, 3)$, and $(w_1, w_2, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$, where n represents the number of objects, m the knapsack capacity, p_i the profit per unit weight of object i , and w_i the weight of object i . 6

Contd. ...

(2)

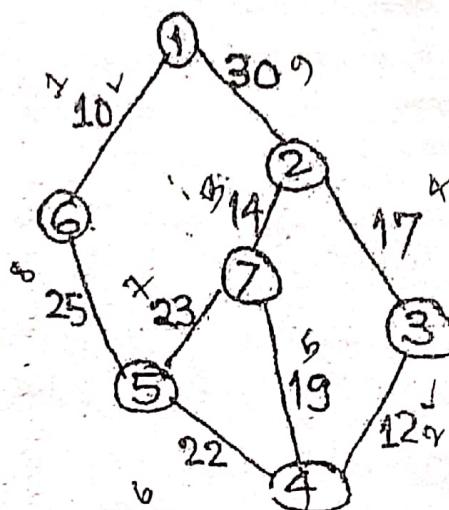
4. Define algorithm. Express the asymptotic notation using big O of $f(n)$ defined as follows:

$$f(n) = 10n^2 + 4n + 4$$

2+8

- 5(a) Using Kruskal's algorithm, find the minimum-cost spanning tree for the given graph. Show all stages in the algorithm.

6



- (b) Discuss about graph coloring problem.

4

- What is 8-Queens problem? What algorithm design strategy would you adopt to solve this problem? Develop an algorithm for it.

3+1+6

7. Describe briefly the branch-and-bound strategy of algorithm design. Mention a few types of problems that can be solved by using this strategy.

6+4

8. Describe NP-complete problems in detail. Why is it important to know about such problems?

7+3

- 9(a) Using divide-and-conquer design strategy, develop an algorithm to sort a list of numbers with the help of quick sort sorting technique.

5

- (b) Discuss about travelling sales person problem and its solution in the light of dynamic programming.

5

10. Write short notes on:

5+5

(a) Space complexity

(b) Ω asymptotic notation



PURBANCHAL UNIVERSITY
2014

B.E. (Computer)/Fifth Semester

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32
BEG371CO: Algorithm Analysis & Design (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer FIVE questions.

$$5 \times 16 = 80$$

(a) Define Algorithm. Explain recursive algorithm to compute factorial of an integer. 8

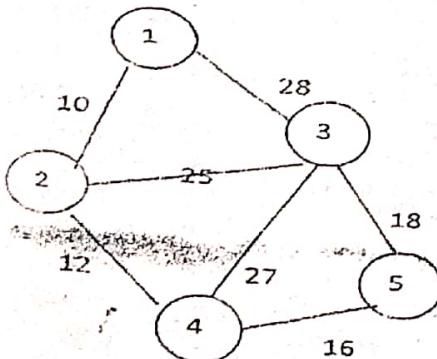
(b) What do you mean by asymptotic notation? Define and explain the notion Big O with example. Explain divide and conquer technique. 4+4

2(a) Obtain a recurrence relation to calculate computing time of quick sort. For the following set of numbers search the no. 14 using binary search algorithm and show all the steps: 5, 9, 12, 14, 58, 61, 101, 106. 8

(b) Write and explain the concept of Merge sort and calculate the time complexity of this. 8

(a) Explain the general concept of greedy method, with its control abstraction. 8

(b) Identify the difference between Prim's and Kruskal's algorithm. Obtain a minimum cost spanning tree using prim's algorithm from the following graph. 2+6



Contd. ...

4(a) What do you mean by dynamic programming? Obtain a multistage graph for 3 resources and 2 projects. 2+6

(b) Write and explain the concept of all pairs shortest path approach. What do you mean by backtracking? Explain its general concept. 4+4

5(a) Define and explain the concept of State space tree. Obtain a state space tree for 4-queens problem. 8

(b) Explain the difference between depth first and breadth search technique with example. 8

6(a) What do you mean by NP-Hard and NP complete problem? Explain their difference. 8

(b) Define and explain decision algorithm, optimization problem and optimization algorithm. 8

PURBANCHAL UNIVERSITY

2013

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG371CO: Algorithm Analysis & Design (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer TWO questions.

$2 \times 12 = 24$

1(a) ✓ What is time complexity? Develop an efficient algorithm for finding the sum of n numbers. Draw step table for this algorithm and find out its time complexity using big O asymptotic notation. $2+2+2+2$

(b) Define algorithm. What are the criteria that all algorithms must satisfy? $1+3$

2(a) Describe in brief how the divide-and-conquer strategy is used for designing efficient algorithms. 4

(b) Using divide-and-conquer strategy, design an algorithm for merge sort sorting technique. Compute its time complexity. $6+2$

3(a) Give the algorithm for greedy strategies for the Knapsack Problem. 5

(b) Using greedy strategy, find an optimal solution to the Knapsack instance $n=3$, $m=20$, $(p_1, p_2, p_3)=(25, 24, 15)$ and $(w_1, w_2, w_3)=18, 15, 10$, where n represents the number of objects, m the Knapsack capacity, p_i the profit per unit weight of object i , and w_i the weight of object. 7

Group B

Answer EIGHT questions.

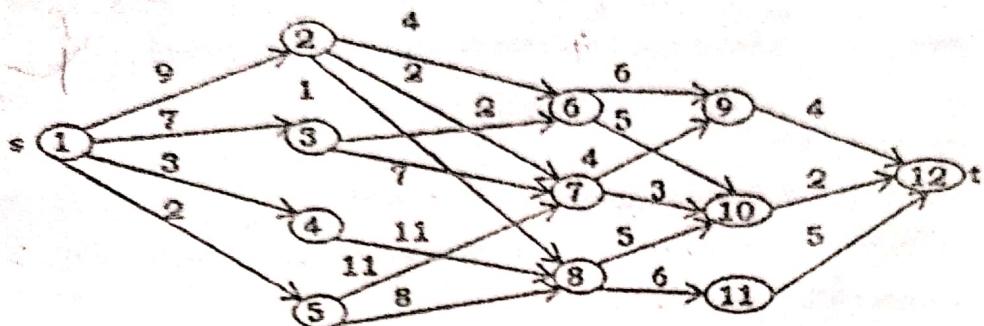
$8 \times 7 = 56$

3. What is dynamic programming? How does it differ from greedy strategy? $4+3$

Contd. ...

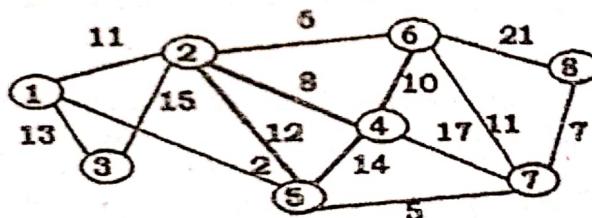
(2)

5. Find a minimum-cost path from s to t in the given multistage graph using either forward or backward approach. 7



6. Express the asymptotic notations using big O and Ω of $f(n)$ defined as follows: $f(n) = 100n+6$. 4+3

7. Using the Prism's algorithm, find the minimum-cost spanning tree for the given graph. Show all stages of the algorithm. 7



8. What is backtracking algorithm design techniques? Give a backtrack solution to the 8-queens problem. 3+4

9. Describe briefly the branch-and-bound strategy of algorithm design. Mention a few types of problems that can be solved using this strategy. knapsack 4 Traveling Salesperson 4+3

10. What are NP-hard and NP-complete problems? Discuss. 7

11. Using divide-and-conquer design strategy, develop an algorithm to sort a list of numbers with the help of selection sort sorting technique. 7

10. Write short note on any TWO: 2×3.5=7
(a) Dijkstra's algorithm
(b) Graph colouring
(c) Performance measurement

**PURBANCHAL UNIVERSITY
2018**

B.E. (Computer)/Fifth Semester/Final

Time: 01:30 hrs.

Full Marks: 40 /Pass Marks: 16

BEG396MS: Research Methodology (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions.

$5 \times 8 = 40$

1. Define social research. What are the different phases of social research? 3+5
2. What is report writing? Discuss the elements of report writing. 2+6
3. What are the different roles of research in engineering field?
Differentiate between basic and applied research. 4+4
4. Explain the statement "Hypothesis is taken as most important instrument in research process". 8
5. What is a research problem? Explain about the different steps taken while formulating the research problems. 2+6
6. Write short notes on:
(a) Reliability and validity
(b) Literature review
(c) Case study research
(d) Sampling 4×2=8



PURBANCHAL UNIVERSITY

2016

B.E. (Computer)/Fifth Semester/Final

Time: 01:30 hrs.

Full Marks: 40 /Pass Marks: 16

BEG396MS: Research Methodology (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions. **5×8=40**

1. What is research? What are its objectives and significance?
2. What is sampling? What is quota sampling and its limitations?
3. Give the meaning and importance of data collection. Describe the sources of secondary data.
4. What is interviewing? What are the requirements of a successful interview?
5. What is research design? Write down the descriptive research design.
6. How is a Likert Type of scale developed?
7. What is research report? Describe the layout or format of a research report.



PURBANCHAL UNIVERSITY

2014

B.E. (Computer)/Fifth Semester/Final

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BEG396MS: Research Methodology (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

$$5 \times 8 = 40$$

Answer FIVE questions.

1. Define the term 'Research'. What are the steps followed in a research process explain in brief. 2+6
2. Explain the nature and functions of a hypothesis in a research process. 8
3. Define survey method of data collection. Write short note on types of surveys. 2+6
4. What is research proposal? What are the major elements of research proposal? 4+4
5. What do you know about research report? Briefly explain the general format to be followed in preparing a research report. 4+4
6. Write short notes on any TWO:
 - (a) Basic and applied research
 - (b) Standard deviation and C. V.
 - (c) Validity and reliability

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PURBANCHAL UNIVERSITY
2013

B.E. (Computer) / Fifth Semester / Final

Time: 01:30 hrs.

Full Marks: 40 / Pass Marks: 16

BEG396MS: Research Methodology (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Answer FIVE questions.

- 1/ What is Research? What are the Phases of social Research?
Discuss about Fundamental and Applied Research.
- 2/ What is research design? What are its various steps?
3. Write down the requirements of a good questionnaire and mention the process of its presentation.
- 4/ What is sampling? Write down its characteristics and types.
- 5/ What is Research Report? Describe in brief the general format of Research Report.
- 6/ Write short notes on any THREE:
(a) Bibliography
(b) Reliability
(c) Standard Deviation
(d) Selection of Research Topics

2013

B.E. (Civil/Computer/Electronics & Comm.)/Sixth Semester/Final
Time: 01:30 hrs. Full Marks: 40/Pass Marks: 10

BEG396MS: Research Methodology

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions.

$5 \times 8 = 40$

1. Define applied research? Why academicians generally adopt fundamental research than applied research? 2+6

Or,

What is meant by literature review? What are the steps to be followed in a research? 4+4

2. What is sampling? Discuss the type of sampling in brief 4+4

3. If you have to carry out a research on "Working physical environment within a carpet industry", then, which technique would you prefer to collect the information (data)? Justify your selection of data collection technique. 2+6

4. What is the role of research report to an engineer? Give a format of a report, which is generally used; in Universities. 2+6

Or,

What is executive summary? Differentiate between reference and Bibliography. 4+4

5. What do you understand by the following terminologies? Give your clear views on them. (any FOUR): 4×2=8

- | | |
|-----------------|-----------------------|
| (a) Sampling | (b) Validity |
| (c) Appendix | (d) Reliability |
| (e) Methodology | (f) Literature review |

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Validity

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PURBANCHAL UNIVERSITY

2012

B.E.(Civil/Computer/Electronics & Comm.)/Sixth Semester/*Chance*
Time: 01:30 hrs. Full Marks: 40/Pass Marks: 16

BEG396MS: Research Methodology

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

$5 \times 8 = 40$

Answer any FIVE questions.

1. Define applied research? Why academicians generally adopt fundamental research than applied research?

2. Define hypothesis. What are the steps to be followed in a research?

3. What are the characteristics of a scientific Research? Describe any four of them.

4. If you have to carry out a research on "Working physical environment within a Garment Industry", then, which technique would you prefer to collect the information (data)? Justify our selection of data collection technique.

5. What is sampling? What are the advantages and disadvantages of sampling? Describe the key points that must be considered in field work.

6. Write short notes on any FOUR:

- (a) Bibliography
- (b) Validity
- (c) Appendix
- (d) Report
- (e) Standard Deviation
- (f) Literature Review



PURBANCHAL UNIVERSITY

2012

B.E. (Civil/Computer/Electronics & Comm.)/Sixth Semester/Final
Time: 01:30 hrs. Full Marks: 40/Pass Marks: 16

BEG396MS: Research Methodology

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions.

$5 \times 8 = 40$

1. What are the quality of a good research and explain briefly about the steps which are required to carry out for any research work.
2. Explain the different types of sampling method and write some precaution which should be taken before carry out the sampling.
3. What is research proposal? Write the elements of research proposal and also explain the procedure while selecting research topic.
4. Write different technique for primary data collection and also compare the method of interview and questionnaire for collecting data according to their merits and demerits with appropriate examples.
5. Write the source of data and also explain, with example, the necessary caution while collecting and using secondary data for research.
6. How can you process and analyze the data? List the methods of presentation of data.
7. Write short notes on any TWO:
 - (a) Research Report
 - (b) Hypothesis
 - (c) Case Study

22

PURBANCHAL UNIVERSITY

2018

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG372CO: Computer Graphics (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

8×10=80

1. What is computer graphics? Explain how computer graphics is used in education training and entertainment? 2+8
2. Explain raster and vector display architecture. List out its advantages and disadvantages. 8+2
- 3(a) Explain the working mechanism of beam and shadow masking method to produce color CRT. 3+3
- (b) Explain the use of look-up table to increase the intensity level values with suitable diagram. 4
4. List out the disadvantages of DDA algorithm for drawing lines. Explain Bresenham's line drawing algorithm with example. 2+8
5. What is 3d-transformation? Explain 3d-rotation with example and necessary derivatives. 2+8
6. What do you understand by clipping? Explain Cohen-Sutherland line clipping algorithm. 2+8
- 7(a) Explain ambient light, diffuse and specular reflection. 6
- (b) Discuss about Open GL. 4
8. Why hidden line and hidden surface removal techniques are needed? Explain any one. 4+6
9. Write short note on any TWO:
(a) Perspective Projection
(b) Mechanical and optical mouse
(c) Phong shading models 5+5



PURBANCHAL UNIVERSITY

2015

B.E. (Computer) / Fifth Semester / Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG372CO: Computer Graphics (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

$8 \times 10 = 80$

- 1(a) Define resolution. Discuss important of computer graphics. 1+4
- 1(b) Briefly explain light pen and touch screen. 5
- 2(a) Define frame buffer. Why is it required? 2+2
- (b) Discuss any color manipulation technique. 6
3. Differentiate between vector and raster display architecture. Explain advanced raster graphic architecture. 4+6
4. Explain Bresenham's midpoint ellipse drawing algorithm. 10
5. What is scaling? Discuss two-dimensional fixed point scaling. 2+8
6. What is clipping? Discuss Sutherland Hodgman polygon clipping algorithm with an example. 2+8
7. What is projection? Explain parallel and prospective projection. 2+8
8. What are different surface removal technique? Explain z-buffer method. 2+8
9. Explain gouraud shading method with example. 10
10. Write short notes on any TWO: 5+5
- (a) Open GL
- (b) Graphical file format
- (c) Bezier Curve



PURBANCHAL UNIVERSITY

2013

B.E. (Computer/Electronics & Comm.)/Sixth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG375CO: Computer Graphics

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

1. What is Computer Graphics? Explain the uses of Computer Graphics in various real world applications. 2+8
2. Consider two raster systems with resolution of 640x480 and 1280x 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel in each system? 10
3. Explain the Vector and raster scan architectures. How is the limitation of random scan architecture overcome by raster scan architecture? 8+2
4. Digitize the intermediate pixels in the first quadrant of a circle having radius =7 with center at (50, 50). How can we get full circle though we sample only in one octants? 8+2
5. How window to view port transformation is carried out? Show steps with matrix form. 10
6. What do you mean by visible surface detection methods? Explain the depth buffer method of visible surface detection method. 2+8
7. Describe how normal vector interpolation technique can be used in rendering a realistic 3D object. Compare the performance of this method with intensity interpolation method. What are the assumptions that should be valid for an accurate rendering using flat shading method? 10

Contd ...

8. What are the various phases of software project development?
Explain. 10

9. Write short notes any TWO:
(a) Fluorescence and phosphorescence
(b) Perspective projection
(c) Open Graphics Library

PURBANCHAL UNIVERSITY

2012

B.E. (Computer/Electronics & Comm.)/Sixth Semester/*Chance*
Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG375CO: Computer Graphics

Candidates are required to give their answers in their own words as far as practicable.

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Answer EIGHT questions.

$8 \times 10 = 80$

1. ✓ Explain the general Bresenham's line drawing algorithm with its advantages.
2. ✓ Describe the concept of Cohen-Sutherland line clipping algorithm briefly.
3. ✓ How limitation of Random scan architecture is overcome by raster scan architecture. Describe color manipulation technique in raster scan display.
4. ✓ Explain the different application area of computer graphics.
5. ✓ Why machine independent languages are needed for graphics?
Explain the different file formats of computer graphics.
6. Describe Project management and planning technique in brief.
7. ✓ Why shading is needed for data visualization? Explain Specular reflection and Gouraud shading model with proper derivations.
8. ✓ The coordinate of a point of a 3D object is (40, 50, 60). Obtain the resultant matrix after scaling of this point taking (Sx, Sy, Sz) as (2, 2, 3).
9. ✓ Explain Scan Line method of detecting hidden line and hidden surface with example.
10. Explain three basic 2-D transformations in detail.

PURBANCHAL UNIVERSITY

2011

B.E. (Computer/Electronics & Comm.)/Sixth Semester/Chance

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 42

BEG375CO: Computer Graphics

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

1. Discuss the application of computer graphics in brief. Explain the working mechanism of beam and shadow masking method to produce color CRT. 5+5
2. Define frame buffer. Differentiate between raster and vector display architecture. 3+7
3. Explain the mechanism of window to view port transformation.
Why do we often apply clipping against world-coordinate rather than the view-coordinate? 6+4
4. List out the problem of DDA. Draw the line (-5, 5) to (2, 1) using Bresenham's line drawing algorithm. 2+8
5. Explain different types of three dimensional transformations. Explain with examples. 10
6. Explain the program debugging techniques. Write an algorithm to generate the circle by using Bresenham's line drawing algorithm. 4+6
7. What are the different hidden line and hidden surface removal technique. Explain any two of them in brief. 2+8
8. Discuss different polygon rendering methods. Explain constant shading model for rendering three dimensional objects. 5+5
9. Write short notes on any TWO:
(a) Ambient and diffuse reflection
(b) Need for machine independent graphical language scaling.
(c) Optical and mechanical mouse



PURBANCHAL UNIVERSITY

2011

B.E. (Computer/Electronics & Comm.)/Sixth Semester/Final
Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG375CO: Computer Graphics

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

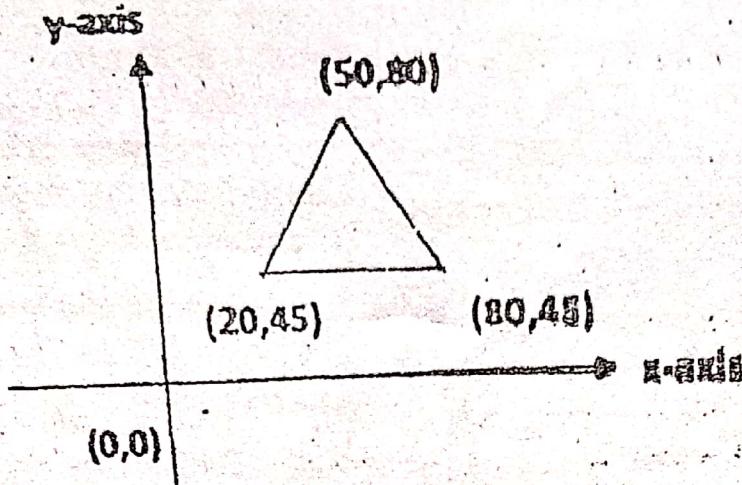
- 1(a) Define the term Pixel and Resolution. How Computer Graphics is applied in Modern era of science and technology? 2+4
- (b) Explain any two hardware components used as an input in computer graphics. 4
- 2(a) What are the advantages of flat panel display over CRT display? Write down the detail working principle of Shadow mask CRT display. 2+4
- (b) Differentiate between Raster-Scan display technology and Vector Scan display technology. 4
- 3(a) Derive the mid point ellipse drawing algorithm with necessary expression. 6
- (b) Digitize an ellipse for $(x^2/81 + y^2/36) = 1$. 4
- 4(a) What do you mean by Clipping? Explain Cohen Sutherland Line Clipping Algorithm in details. 2+4
- (b) Digitize the line with end points (1,3) and (7,9) using Bresenham's line drawing algorithm. 4
- 5(a) Explain ambient light, diffuse and specular reflections. 6
- (b) Why do we need machine independent graphical language? 4
- 6(a) What do you mean by Hidden Surface Removal Technique? Explain scan-line method of visible Surface detection. 2+4

Contd. ...

- (b) Rotate the following triangle with $0-45^\circ$ by calculating the transformation matrix, diagram, and final matrix.

4

$$\begin{bmatrix} 50 \\ 80 \\ 1 \\ 0 \end{bmatrix} \begin{bmatrix} 50 \\ 80 \\ (-\sin 45) \times 50 \\ \cos 45 \times 80 \end{bmatrix}$$



7(a) Explain about Project Management technique.

7

(b) What do you mean by Virtual Reality?

3

8(a) What do you mean by Projection System? Explain its types.

6

(b) Translate 2-dimensional transforms into 3-dimension for translation, rotation and reflection.

4

9. Write short notes on any FOUR:

$4 \times 2.5 = 10$

(a) Phong Shading

(b) File Format

(c) Polygon Table

(d) GUI (Graphical User Interface)

(e) Light Pen

≡

1x268
5536 \Rightarrow 26 tasks
pixel = 6 bit requires
 $16 + 104 \times 268$
pixel $\times 8$ bits
12582912 KB

PURBANCHAL UNIVERSITY

2018

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG373CO: Operating System (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

$8 \times 10 = 80$

- 1(a) Explain multiprogramming system and time sharing system with their advantages and disadvantages. 6
- (b) Discuss strict alternation method in providing mutual exclusion with its drawback. 4
2. What is thread? Differentiate between user level and kernel level thread. Find the average waiting time, turnaround time and response time from following information using SJF algorithm.

2+3+5

Process	P1	P2	P3	P4	P5
Arrival time	1	3	4	5	7
CPU burst time	9	7	5	4	2

3. Define race condition and critical section. How does semaphore provide software solution to producer consumer problem? Explain. 4+6

- 4(a) Explain best fit and worst fit methods with a suitable example. 4
- (b) Consider the page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for each of the following page replacement algorithms assuming 4 page frames? 6
- (i) LRU
- (ii) FIFO
- (iii) Optimal

(2)

5. What are the condition for deadlock to occur? A system that uses the banker's algorithm deadlock avoidance has five process and four type of resources .There are multiple resources of each type. Determine whether the state sequence $\langle P_1, P_5, P_3, P_2, P_4 \rangle$ is safe or not. If it is safe sow how the process can complete. If not, show how they are in deadlock. 4+6

Process	Current allocation				Maximum needed				Available resource			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	1	0	2	0	2	2	2	2	3	4	0	1
P2	0	3	1	2	3	2	0	0				
P3	2	4	5	1	0	3	2	4				
P4	3	0	0	6	2	5	0	2				
P5	4	2	1	3	2	0	0	1				

6. What are the advantage and disadvantage of distributed system?
How does communication take place in distributed system? 5+5
7. Define device controller and clock. Explain the working mechanism of DMA. 4+6
8. What are the importance of file? Explain different properties of file. How we can protect the file in multiuser system. 2+2+6
9. Write short notes on any TWO:
(a) Real time operating system
(b) Fragmentation
(c) Mac OS

PURBANCHAL UNIVERSITY

2015

3.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG373CO: Operating System (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

$$8 \times 10 = 80$$

- Explain the functions of operating system. Discuss operating system as a resource manager. 5+5
- Define busy-waiting in IPC. How can we solve the problem of mutual exclusion with busy waiting? Explain a Peterson solution. 2+3+5
- Compare preemptive and non-preemptive scheduling. Consider set of process with their burst time and arrival time as shown below

Process	Arrival Time	Burst Time
P1	0	4
P2	1	5
P3	2	2
P4	3	1
P5	4	6
P6	6	3

Assume quantum time=2 sec. Find the better scheduling using shortest job first, round robin and first come first served scheduling. 3+7

- Define semaphore with example. What do you mean by reader/writer problem? Explain with example. 4+6
- Define deadlock with its principles. Explain Banker's algorithm for multiple resources with example. 4+6
- Discuss memory management in multiprogramming. Explain paging. 5+5

Contd. ...

PURBANCHAL UNIVERSITY

2013

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG373CO: Operating System (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

- Explain operating system as a resource manager. What are multi-programming and multi-processing systems? 4+6
- (a) What do you mean by PCB and context switch? 4
- (b) What is critical section problem? How does busy-waiting solve this problem? Explain any one method. 2+4
- Explain memory management with linked list and demonstrate first-fit, best-fit, next-fit, and worst-fit with suitable example. 10
- Compute average waiting time and average turnaround time using FCFS, SJF, and Round Robin (1 time Slice=2 ms) scheduling algorithms for the following processes:

Process	Burst Time (in ms)
P ₁	16
P ₂	6
P ₃	13
P ₄	5

- What are directories? Explain directory operational? Discuss the several file allocation methods. 4+6
- Compute the number of page faults using FIFO, Optional, and LRU page replacement algorithms for the given reference string. (Assume, Number of memory frames= 4). Reference string: 5 2 4 2 3 4 7 1 2 7 5 3 1 2 5

- Define distributed processing. Explain RPC in distributed systems. 5

Contd. ...

(2)

Q. What is RTOS? Distinguish between soft real time and hard real time.

5

Q. Why information need to be stored on disks?

2

Q. Assume a disk with 50 cylinders, numbered from 0 to 49. The current disk request is to read a block on cylinder 16, and other new disk requests come in to the disk driver for cylinders 5, 22, 8, 12, 42, 11, 19, 33, and 37, in that order. Compute the total number of disk arm movements using closest Cylinder Next algorithm and Elevator algorithm (initially moving upward).

8

Q. Explain deadlock recovery.

4

Q. Using Banker's algorithm, determine whether the following system is safe or not. Also determine the safe sequence, if it's safe state.

6

No. of Processes = 5 $\langle P_1, P_2, P_3, P_4, P_5 \rangle$

No. of Resources = 3 $\langle A, B, C \rangle$

Total Resources = $\langle 8, 6, 7 \rangle$

Process	Allocation			Max		
	A	B	C	A	B	C
P ₁	0	2	0	6	2	3
P ₂	3	0	0	3	2	2
P ₃	0	0	2	7	1	5
P ₄	2	1	1	4	2	2
P ₅	1	1	2	2	1	2

10. Write short notes on any TWO: 2x5=10

(a) Terminals

(b) Paging

(c) File sharing

(2)

Q. Define real time operating system with example. Explain different operations on file.

Q. (a) How is process different from thread? Why do we need to create threads?

(b) Discuss monitors in IPC.

Q. Write short notes on any TWO:

(a) IPC

(b) Disk

(c) Segmentation

2

PUNJAB INSTITUTE OF TECHNOLOGY

ROU

S.E. (Computer) / Fifth Semester / Final
Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

REG37300: Operating System

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

1. Explain in detail about Operating system as a users/computer interface and as a resource manager? 5+5

2(a) Describe briefly on states of a process model and the transition possible among the processes. 7

2(b) Differentiate between a program and a process. 3

3. Calculate the average waiting time for FIFO and Round Robin scheduling algorithm. Assume Quantum=4ms. 5+5

Process	Arrival Time (ms)	Burst Time (ms)
A	0	8
B	1	1
C	3	2
D	4	1
E	2	5

4(a) Define Deadlock. Explain the four conditions that lead to a deadlock. 2+4

4(b) Explain the deadlock prevention methods. 4

5(a) What is critical-section and race-condition? 4

5(b) Describe the operations on a file. 5

6. The disk requests come in to the disk driver for cylinders 10, 20, 22, 2, 40, 6 and 30, in the order. A seek takes 6 msec/cylinder moved. How much seek time is needed for? 10

(a) FCFS

(b) Shortest Seek First

(c) Elevator algorithm

In all cases, assume the arm head is initially at cylinder 20.

Contd ...

(2)

7. Consider a system with five processes P0 through P4 and three resources types, A, B, C. Resource type A has 10 instances, type B has 5 instances and type C has 7 instances. Suppose the following snapshot of the system has been taken.

Process	Allocation	Max	Available
	ABC	ABC	ABC
P0	010	783	332
P1	200	322	
P2	302	902	
P3	211	222	
P4	002	433	

(a) What will be the content of the need Matrix?

(b) Is the system in safe state? If yes, then what is the sequence?

8. ✓ What is Virtual Memory? Differentiate between Paging and Segmentation with suitable demonstration of example.

9. ✓ What is Page Fault? Consider the following page reference string: 0, 2, 1, 6, 4, 0, 1, 0, 3, 1, 2, 1

10 How many page faults would occur for the following page replacement algorithms, assuming an allocation of 3 frames? 1+9

- (a) LRU
- (b) FIFO
- (c) Optimal

10. Write short notes on any TWO:

- (a) Interprocess communication
- (b) Direct Memory Access (DMA)
- (c) Preemptive Vs Non-Preemptive scheduling algorithms

5+5

30 80/80

PURBANCHAL UNIVERSITY

V SEMESTER FINAL EXAMINATION-2007

LEVEL: B. E. (Computer)

SUBJECT: BEG373CO, Operating System

TIME: 03:00 hrs.

Full Marks: 80

Pass Marks: 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Attempt EIGHT questions.

Q. [1] What is an operating system? Discuss operating system as a resource Manager.

Q. [2] What is Inter-Process Communication? Discuss Race Condition, with example.

Q. [3] Discuss the FCFS (First Come First Serve), SJF (shortest job first) and RR (Round Robin) scheduling algorithm, with appropriate examples.

Q. [4] What are the major advantages of Disks over using main memory for storage? Discuss Disk Arm Scheduling Algorithm

Q. [5] Describe the different conditions of deadlock. How the different conditions for a dead lock can be modeled using directed graph?

What are the different ways to avoid deadlock by careful resource allocation? Discuss Banker's Algorithm for a single resource.

Contd. ...

PURBANCHAL UNIVERSITY

2009

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG373CO: Operating System

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

1. Define operating system. Discuss operating system as a resource manager. Distinguish between multiprogramming and multiprocessor systems. 2+4+

2. What is race condition? Why mutual exclusion is required? How mutual exclusion can be achieved? Describe any one proposal. 2+2+

3. Define process and its different states. What are the various operations on a semaphore? Solve the producer-consumer problem using semaphore. 2+4+

4. What are the differences between preemptive and non-preemptive scheduling? Consider the following set of processes, with the length of the CPU burst time given in milliseconds: 2+

Process	Burst Time	Priority
P1	12	3
P2	5	1
P3	2	3
P4	8	4
P5	2	2

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5, all at time 0. Identify which scheduling algorithm among a non-preemptive priority (a smaller priority number implies a higher priority) and a round robin with a time-slice 3, would give minimum average waiting time.

(2)

Explain deadlock with necessary conditions. Consider there are 5 processes in a system P₁, P₂, P₃, P₄, and P₅ having 4 resources R₁, R₂, R₃ and R₄, where P₁ holds R₁ and wants R₂, P₂ holds R₃ and wants R₁, P₃ wants R₄, P₄ holds R₂ and wants R₄, P₅ holds R₄ and wants R₁. Check using resource allocation graph method whether the given system is in deadlock or not. If yes, what processes are deadlock.

10

Differentiate between internal fragmentation and external fragmentation.

5

What do you mean by virtual memory? Explain paging in brief.

5

What is Belady's anomaly? Use FIFO page replacement algorithm in the following reference string having four frames and calculate the no. of page faults:

2+8

1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6

Suppose that a disk drive has 100 cylinders, numbered 0 to 99. The drive is currently serving a request at cylinder 43, and the previous request was at cylinder 25. The queue of requests, in FIFO order, is 86, 70, 13, 74, 48, 09, 22, 50, 30. Calculate the number of disk arm movements using Shortest-Seek-First and Elevator Scheduling algorithms.

10

What is a file system? Explain the different file system implementation with advantages and disadvantages.

2+8

Write short notes on any TWO:

5+5

- a) First fit, Next fit, Best Fit
- b) Clocks
- c) Threads



(2)

Q. [7] Discuss the need of Page replacement? Use FIFO (First in First out) page replacement algorithm in the following reference string having three frames and calculate the no. of page faults.

7 0 1 2 0 3 0 4 2 0 3 0 3 2 1 2 0 1 7 0 1

Q. [8] Discuss the principle of fixed and variable partition scheme of memory management.

Q. [9] Explain different organization and operations of directory.

Q. [10] Write short notes on any TWO

- [a] Page fault
- [b] Terminal
- [c] Process Control Block (PCB)
- [d] Virtual memory



SN

PURBANCHAL UNIVERSITY

2008

Computer/Fifth Semester/Final

Time: 03:00 hrs

Full Marks: 80 , Pass Marks:

BEG373CO, Operating System

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

1. Define operating system. How does the operating system present the user with the equivalent of an extended machine? Compare timesharing and multiprogramming systems. 2+4+4
2. Define mutual exclusion along with suitable example. What are the difference between process and thread? 6+4
3. Explain the Peterson's algorithm along with suitable example. Is quantum size critical in the context of process scheduling for the effective operation? 6+4
4. What is a device controller? How does it help programmer? What are the uses of clock in computer system? 5+5
5. Assume a system with five concurrent processes. The total four resource types exist in the amounts as $E=(6, 4, 4, 2)$; the current allocation matrix and the allocation request matrix are as follows. Using Banker's algorithm, explain if this state is deadlock safe or unsafe. 10

Current Allocation Matrix				
Process	R0	R1	R2	R3
P0	3	2	1	1
P1	2	0	2	
P2	1	1	2	0
P3	3	2	1	0
P4	4	0	0	1

Allocation Request Matrix				
Process	R0	R1	R2	R3
P0	2	0	1	1
P1	1	1	0	0
P2	1	1	0	0
P3	1	0	1	0
P4	0	1	0	1

PURBANCHAL UNIVERSITY

2009

B.E. (Computer)/Fifth Semester/Chance

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 3

BEG373CO: Operating System

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

1. Explain four condition of deadlock. What are the different approaches for handling deadlock? Explain resource allocation graph method to detect deadlock in the system.
2. Consider the following set of processes, with the length of CPU-burst time given in milliseconds. The processes have arrived in order from P₁ to P₅ all at time 0. Draw Gantt charts illustrating the execution of these processes using Round Robin (with quantum size=2), SJF and nonpreemptive priority (a smaller priority no. implies a higher priority) scheduling.

Process	Burst time	Priority
P ₁	10	3
P ₂	2	1
P ₃	3	3
P ₄	1	4
P ₅	6	2

Compute the average waiting time for each of the scheduling algorithms.

3. Explain importance of Banker's Algorithm. Consider a system with five processes, (P₀, P₁, P₂, P₃, P₄) and three resource types A, B, C. Resource type A has 10 instances, B has 5 and C has 7 instances.

(2)

Suppose at time 'T₀' the following snapshots of system have been taken:

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P ₀	0	1	0	7	5	3	3	3	2
P ₁	2	0	0	3	2	2			
P ₂	3	0	2	9	0	2			
P ₃	2	1	1	2	2	2			
P ₄	0	0	2	4	3	3			

Calculate the need matrix and suppose if P₄ request one additional instance of A and two of C; decide whether this request is immediately granted? If so find out the safety sequence.

What is Belady's anomaly? Why is it needed to replace a page from memory? Consider the following reference string:

1, 2, 5, 6, 0, 1, 2, 0, 4, 3, 2, 1, 6, 01, 7, 0, 1

Find out no. of page faults in above string using FIFO.

Discuss two-level scheduling and policy versus mechanism with example.

Discuss principles of I/O hardware.

What is terminal? Explain different types of terminals with proper diagram.

Discuss fixed and variable partition with example.

Write short notes on any TWO:

- (a) Buddy system
- (b) Segmentation
- (c) File sharing

22

(2)

6. What are the functions of memory manager? What is virtual memory? How does O.S. implement virtual memory mechanism? Explain. 3+2+5

7. Explain with a suitable example the differences between the memory management with bitmaps and memory management with linked lists. 10

8. Develop a complete solution with any mechanism of your choice for Producer Consumer problem. 10

9. What are the file attributes? Explain the roles of different types of path name with the aid of example. 4+6

10. Write short notes on any TWO:

- (a) History of O.S.
- (b) Deadlock prevention
- (c) FIFO Schedule
- (d) Windows vs. Unix O.S.

2x5=10

PURBANCHAL UNIVERSITY

2016

B.E. (Computer)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG372CO: Computer Graphics (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

$$8 \times 10 = 80$$

(a) Define Computer Graphics, pixel and resolution. How can computer graphics be used in simulation and education? **(5)** 3+3

(b) Explain different types of touch panels in brief. **4**

(c) Write down advantages of Bresenham algorithm over DDA algorithm. **(3)** 3

(d) Explain on Raster Scan Architectures. How is the limitation of Random Scan Architecture overcome by Raster Scan Architecture? **(3)** 5+2

(e) Explain two-dimensional rotation and translation with example. **(6)** 10

Derive the midpoint circle generating algorithm with proper illustration. **10**

(f) Explain 2D window to viewport coordinate transformation. **(4)** 4

(g) Explain the Sutherland-Hodgeman polygon clipping algorithm with diagrams. **(5)** 6

(h) Explain various type of file format in Computer Graphics. **(4)** 6

(i) Explain Specular Reflection Method in detail. **(2)** 4

(j) Explain the Gouraud method in detail. **(2)** 6

(k) What do you mean by illumination models? Why Phong Method is better than Gouraud Method? **(2)** 2+2

Contd. ...

PURBANCHAL UNIVERSITY

2016

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG370CO: Numerical Methods (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer SIX questions.

$$6 \times 10 = 60$$

1. Define error, relative error, absolute error and percentage error. If the calculated value of root of a non-linear equation $x^3 - 125 = 0$ is 5.005, then calculate error, absolute error, relative error, absolute error and percentage error. **4+5**

2. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3 rule and find appropriate value of π take $n=6$ **10**

3. Solve the following set of equations using Gauss Jordan Elimination Method: **10**

$$X+Y+Z=3$$

$$2X-Y+2Z=3$$

$$X+2Y-2Z=1$$

4. Solve the differential equation $dy/dx = 4y/x$ and find $y(2)$ using Runge-Kutta Method of 4th order with $y(0)=1$. Take $h=1$. **10**

5. Find an equation in the form of $y=a+bx$ and find y at $x=2.21$ using Least Square Method. **10**

X	1	2	3	4
y	4	5	6	8

6. Consider a steel plate of size 30cm×30cm. If two of sides are held at 500°C and the other two sides are held at 0°C. What are the steady state temperatures at interior points assuming a grid size of 10cm×10cm? **10**

Contd. ...

(2)

Solve the following equation "using Gauss Jacobi iteration Method" 10

$$12X-3Y+Z= 10$$

$$2X+11Y-4Z= 9$$

$$4X-3Y+13Z= 14$$

Prove that the order of convergence for Secant Method is superlinear. 10

Group B

Answer TWO questions.

$$2 \times 10 = 20$$

9. Write an algorithm and program for Bisection Method. 10

10. Write a program in any High Level Language to evaluate the value of a function at specified point using Lagrange Interpolation Polynomial Method. 10

11. Write a flowchart and program in a High Level Language for Trapezoidal rule. 10

(2)

8. Explain Polygon Tables in detail.

9. Why do we need clipping? Explain Cohen Sutherland clipping algorithm with proper diagram. 6

10. Write short note on any TWO:

- (a) Cubic-spline method of generating non-planar surfaces
- (b) Open GL
- (c) 3D Transformation

4

2

PURBANCHAL UNIVERSITY

2018

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG370CO: Numerical Methods (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer SIX questions.

$6 \times 10 = 60$

- 1(a) What do you mean by error? What are the types of errors?
Explain in brief. 5
- ✓ (b) Find a root of the equation $x^2=4x-10$ using Newton-Raphson method. *Newton's* $x^2 - 4x + 10 = 0$ 5
- ✓ 2. Estimate $e^{1.5}$ using Interpolation polynomial for the Newton following sets of data: 10

X	0	1	2	3
$f(x)=e^x-1$	0	1.7183	6.3891	19.0855

3. Fit the following set of data into the form $y=ae^{bx}$. Also find the value of a and b: 10

x	2	4	6	8	10
y	4.077	11.084	30.128	81.892	222.620

4. Solve the following set of equation using Gauss Seidel iteration method upto four digit accuracy: 10

$$20x+y-2z=17$$

$$3x+20y-z=-18$$

$$2x-3y+20z=25$$

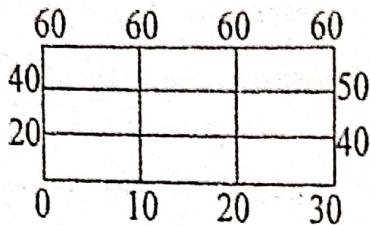
5. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $\frac{3}{8}$ rule and hence estimate the value of π . Also calculate error. 10

6. Using Fourth order R. K. Method find an approximate value of y when $x=1$ given that $dy/dx=x+y$ and $y=1$ when $x=0$. Take $h=0.5$. 10

Contd. ...

(2)

7. Solve the Laplace's equation $U_{xx}+U_{yy}=0$ in the domain of figure given below: 10



Group B

Answer TWO questions.

$2 \times 10 = 20$

- 8/ Write a program to fit the straight line for the given data points. 10
9. Write down a program to compute the interpolation value at a specified point for a given set of data points using Lagrange's Interpolation method. 10
10. Write down the algorithm and program to find a root of linear equation using Gauss elimination method. 10

PURBANCHAL UNIVERSITY

2015

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

REG370CO: Numerical Methods (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer SIX questions.

$$6 \times 10 = 60$$

- What do you mean by numerical computing process? Explain new trends in numerical computing. Find the round off error in storing the number 752.6835 using a four digit mantissa. 2+4+4
- Find out the convergence of secant method. Find the square root of 5 using the fixed point method. 5+5
- Explain why interpolation is important for engineers. Find the Newton interpolation polynomial which agrees to the following data: 3+7

i	0	2	3	
x_i	1	2	3	
$\log x$	0	0.3010	0.4771	0.6021

Use the polynomial obtained to estimate the value of $\log 2.5$.

- Use Simpson's 3/8 rule and Boole's 5 point formula to compute $\int_0^{\pi/2} \sqrt{\sin(x)} dx$. 5+5
- Give the solution for the following set of linear equation by using Gauss Jordan: 10

$$x+2y-3z=-4$$

$$x+3y+z=10$$

$$2x-4y-2z=-12$$

Contd. ...

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PURBANCHAL UNIVERSITY

2014

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG370CO: Numerical Methods (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer SIX questions.

$$6 \times 10 = 60$$

- Discuss truncation, absolute, relative and percentage errors with example. 3+7
- Find the root of the equation $f(x) = e^x - x$; using Newton Raphson method, correct up to 4 decimal places. 3+7
- The square roots of different integers are tabulated below. Calculate the square root of 7 using Lagrange Interpolation.

x	2	4	9	16
$y = \sqrt{x}$	1.414	2	3	4

- Use Romberg's method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal place.

- By the method of least square, fit a curve of the form $y = ae^{bx}$ to the following data:

x:	5	15	20	30	35	40
y:	10	14	25	40	50	62

- Solve the following system of linear equations using Gauss Jacobi Iteration method. 10

$$2x_1 - x_2 + x_3 = 2$$

$$x_1 + 2x_2 - 3x_3 = 0$$

$$2x_1 - 3x_2 + x_3 = 0$$

(2)

7. Solve following differential equation for $y(0.2)$. 10

$$10y'' + (y')^2 + 6x = 0$$

$y(0) = 0, y'(0) = 0$. using Heun's Method. Take $h=0.1$.

Group B

Answer TWO questions.

$$2 \times 10 = 20$$

Write algorithm and program in any high level language to solve the following problems.

8. Write a program that compute a root of a non-linear equation by Newton-Raphson method. 10
9. Write a program to find the integration of the given function using Simpson, Trapezoidal rule. 10
10. Write a program to fit a straight line $y=a+bx$ from given set of data points. 10

(2)

6. Use the classical R-K method to estimate $y(0.4)$ when $Y'(x)=x^2+y$ with $y(0)=0$ assume $h=0.05$. 10

7. Solve the equation: 10

$$2f_{xx}(x, t) = f_t(x, t), \quad 0 < t < 1.5 \text{ and } 0 < x < 4$$

with the following initial conditions

$$f(x, 0) = 50(4-x), \quad 0 \leq x \leq 4.$$

Group B

$$2 \times 10 = 20$$

Answer TWO questions.

Write algorithm and program in any high level language to solve the following problems.

8. Write a program to find the roots of a non linear equation using Newton-Raphson method along with its algorithm. 7+3
9. Give the algorithm as well as program code to fit a transcendental equation. 7-3
10. Write the algorithm and program code to solve an integral function using composite trapezoidal method. 7+3

~~Book Ex.~~

PURBANCHAL UNIVERSITY

2013

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG370CO: Numerical Methods (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer SIX questions.

$6 \times 10 = 60$

- 1(a) What is error? Explain general formula to calculate different errors.
- (b) Explain different characteristics of numerical computation.
- 2(a) Find the real root of the equation $x^3 - 4x - 9 = 0$ correct to 3 decimal places by using bisection method.
- (b) Using Newton Raphson method, find the root correct to two decimal places, given the initial root as 0.5 of the equation $x^3 - 6x + 4 = 0$.
- 3(a) Using the principle of least squares, fit an equation of the form $y = ae^{bx}$ to the following data.

x	1	2	3	4
y	1.65	2.70	4.50	7.35

- (b) The following data gives the melting point of an alloy of lead and zinc. where t is the temperature in degree $^{\circ}\text{C}$ and p is the percentage of lead in the alloy.

p	40	50	60	70	80	90
t	184	204	226	250	276	304

Using Newton's Interpolation formula, find the melting point of the alloy containing 84 percent of the lead.

4(a) Divide the range into 10 equal parts, find the approximate value of $\int_0^2 \sin x dx$ by Simpson's rule.

(b) Compute the integral

$$\int_{-2}^2 e^{-\frac{x^2}{2}} dx$$
 using Gaussian two-point formula.

5(a) Find the eigen values and eigen vectors of the following matrices.

$$\begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$

$$x = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

$$y = \begin{bmatrix} 4 \\ -2 \\ 2 \end{bmatrix}$$

(b) Solve the following system of equations using Gauss-Jordon method.

$$x+2y+z=3; 4x+4y-3z=10; 3x-y+2z=2$$

6(a) Using Euler's method, solve numerically the equation, $y' = x + y, y(0) = 1$, for $x=1$.

(b) Find $y(0.1), z(0.1)$ from the system of equations, $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$ given $y(0)=2, z(0)=1$ using Heun's method.

7(a) Solve the Poisson equation

$$\nabla^2 f = 2x^2 y^2$$

Over the square domain $0 \leq x \leq 3$ and $0 \leq y \leq 3$ with $f=0$ on the boundary and $h=1$.

(b) Solve numerically the wave equation,

$$f_t(x, t) = 2 f_{xx}(x, t) \quad 0 < t < 1.5 \text{ and } 0 < x < 4$$

with the boundary conditions

$$f(0, t) = 0 \text{ and } f(4, t) = 0 \quad 0 \leq t \leq 1.5$$

and initial values.

$$f(x, 0) = 50(4-x) \quad 0 < x < 4$$

(3)
Group B

Answer TWO questions.

Write algorithm and program in any high level language to solve the following problems.

8. To solve a non linear equation using secant Method.
9. To solve system of equation using Gauss Elimination Method
10. To solve differential equations using Runge Kutta 4th order Method.

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PURBANCHAL UNIVERSITY

2010

B.E. (Civil)/Fifth Semester/Chance

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG375CO: Numerical Methods

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer SIX questions.

$6 \times 10 = 60$

- 1(a) What is roundoff error? Find the roundoff error in storing the number 752.6835 using four digit mantissa. 5

- 5(b) Evaluate $\sqrt[3]{10}$ using Newton Raphson method with initial value of $x_0 = 2$. 5

2. Prove that the order of convergence of Secant method is 1.618. 10

3. The velocity distribution of a fluid near a flat surface is given below:

x	0.1	0.3	0.5	0.7	0.9
v	0.72	1.81	2.73	3.47	3.98

Where x is the distance from the surface (cm) and v is velocity (cm/s). Using a suitable interpolation formula obtain the velocity at $x = 0.2, 0.4, 0.6$ and 0.8 . 10

4. Use Romberg integration to evaluate. 10

$$\int_0^1 \frac{1}{1+x^2} dx$$

5. Solve the following system of equations using Jacobi iteration method: 10

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PURBANCHAL UNIVERSITY

2012

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final
Time: 03:00 hrs. Full Marks: 80 / Pass Marks: 32

BEG370CO: Numerical Methods

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Group A

Answer SIX questions.

$6 \times 10 = 60$

- 1(a) Find a real root of the equation $f(x) = x^3 - x - 1 = 0$ by bisection method.

- (b) Solve the equation $\log x = \cos x$ to five decimal places by Newton Raphson method.

- 2(a) Fit the least square geometric curve $y = ax^b$ to the following data:

x:	1	2	3	4	5
y:	0.5	2	4.5	8	12.5

- (b) Given that $\sqrt{12500} = 111.8034$, $\sqrt{12510} = 111.8431$,

$$\sqrt{12530} = 111.9375. \text{ Find the value of } \sqrt{12516}.$$

3. Solve the following equations by Gauss-seidel method. Correct upto three decimal places.

$$2x - 7y - 10z = -17$$

$$5x + y + 3z = 14$$

$$x + 10y + 9z = 7$$

4. The distance(s) covered by a car in a given time (t) is given in the following table:

Time (in minutes):	12	14	18	20	24
Distance (Km):	14	18	23	25	34

Find the acceleration of the car at $t = 17$ minutes.

Contd.

(2)

5. Establish trapezoidal rule for integration and hence evaluate $\int \frac{dx}{1+x^2}$ using Trapezoidal rule by dividing the $[0, 1]$ into 6 equal parts. Also obtain the approximate value of π .

6. Apply Runge-Kutta fourth order method to find the solution of differential equation $\frac{dy}{dx} = x^2 + y^2$ at $x = 1.2$ in steps of 0.1, given that $y=1.5$ when $x=1$.

7. Solve the Partial differential equation $\frac{\partial^2 w}{\partial x^2} + \frac{\partial^2 w}{\partial y^2} = 0$ for the figure given below, by Gauss Jacobi's method.

	1	1	
0	u_3	u_4	0
0	u_1	u_2	0
0	0	0	

Group B

2x10=20

Answer TWO questions.

8. Write a high level program to find the root of the equation using Newton-Raphson method. Also, draw its flowchart. 6+4
9. Write an algorithm and a high level program to solve differential equation using Euler's method. 4+5
10. Write a high level program with its flowchart to find integration of the given function using Simpson's 1/3 rule. 6+4

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(2)

$$\begin{aligned} 2x_1 + x_2 + x_3 &= 5 \\ 3x_1 + 5x_2 + 2x_3 &= 15 \\ 2x_1 + x_2 + 4x_3 &= 8 \end{aligned}$$

6. Find the largest Eigen value and the corresponding Eigen vector of the following matrix, using power methods.

$$\begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

7. Give the equation $dy/dx = 3x^2 + 1$ with $y(1) = 2$. Estimate $y(2)$ by Euler's method using (i) $h = 0.5$ and (ii) $h = 0.25$.
8. Solve the differential equation $dy/dx = 2xy$, $y(0) = 0.5$ from $x = 0$ to $x = 1$ using the fourth order Runge-Kutta method.

Group B

Answer TWO questions.

2x10=20

9. Write a program in any high level language to find the solution of non-linear equation using Secant Methods.
10. Write a program to find the root using Lagrange's Interpolation polynomial.
11. Write an algorithm to find the solution of linear system of equation using Gauss Seidal method.

PURBANCHAL UNIVERSITY
2010

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Chance
 Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32

BEG370CO: Numerical Methods

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Group A

Answer SIX questions.

$6 \times 10 = 60$

1(a) What is roundoff error? Find the roundoff error in storing the number 786.7645 using four digit mantissa.

(b) Evaluate $\sqrt[3]{10}$ using Newton-Raphson method with initial value of $x_0 = 2$.

2. State the test for convergence of fixed point Iteration method for solving non-linear equation. Find the approximate root of the equation, $x^2 - 2x - 8 = 0$ correct to three decimal places using fixed point iteration method, starting with $x_0 = 5$.

3. For the following table of values

x:	10	20	30	40	50
f(x):	2	5	10	12	20

Find $f(14)$ and $f(48)$.

4. Fit the quadratic curve to the following data points:

x:	0	2	5	10	12	18
y:	10	12	15	20	22	30

5. Obtain dy/dx and d^2y/dx^2 for $x = 1.2$ from the following table of values of x and y .

x:	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y:	2.7183	3.3201	4.0552	4.9530	6.0498	7.3881	9.0250

6. Find the largest eigenvalue λ_1 and the corresponding eigenvector V_1 of the matrix.

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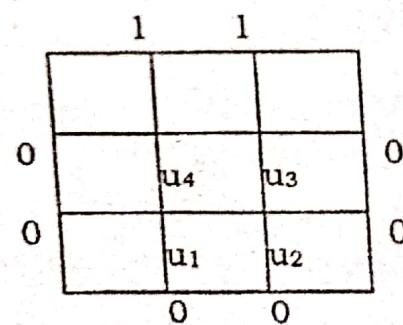
$$\begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

Use power method.

7. Give the equation:

$\frac{d^2y}{dx^2} = e^{x^2}$ with $y(0) = 0$, $y(1) = 0$ estimate the values of $y(x)$ at $x = 0.25, 0.5$ and 0.75 .

8. Solve the equation $u_{xx} + u_{yy} = 0$ in the domain of the given figure by a) Jacobi Method b) Gauss Siedel's Method



Group B

Answer TWO questions.

$2 \times 10 = 20$

9. Write a program in any high level language to evaluate numerical integration of a given function using Simson's 3/8 rule.
10. Write an algorithm to find the solution of the systems of linear equations using Jacobi Integration method.
11. Write a program in any high level language to find the solution of a differential equation using Ranga-Kutta Method.



PURBANCHAL UNIVERSITY

2008

B.E. (Computer/Electronics & Communication)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

REG370CO, Numerical Methods

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Group A

Answer SIX questions.

$$6 \times 10 = 60$$

(a) Calculate the round off error in storing the number 123.45678 using 4 digit mantissa using chopping and symmetric rounding technique.

(b) Prove that the Newton Raphson Method is Quadratic Convergent.

Find a root of the following equation using Bisection Method correct up to three decimal places.

10

$$e^x - x^3 = 0$$

Use appropriate interpolation formula for the following table to find $f(0)$.

10

x	0	2	3	4	5	6
$f(x)$	5	3	20	55	110	197

and also find $f(2)$.

Fit a least square polynomial of the form $y = ae^{bx}$ for the following tabulated data.

x	-1	3	7	11	15	19	23
y	8.33	3.57	2.27	1.67	1.32	1.09	0.88

Evaluate the following integral using Trapezoidal rule and Simpson's 3/8 rule by taking 10 points.

10

PURBANCHAL UNIVERSITY

2010

B.E. (Computer/Electronics & Comm.)/Fifth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG370CO: Numerical Methods

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Group A

Answer SIX questions.

$$6 \times 10 = 60$$

(a) Discuss Absolute, Relative and Percentage errors.

(b) Use the Secant method to compute a root of the equation

$$x^2 - 5x + 6 = 0.$$

2. Solve the equations

$$2x + 3y + z = 9$$

$x + 2y + 3z = 6$ by the method of factorization.

$$3x + y + 2z = 8$$

3. Establish Trapezoidal rule for integration and hence evaluate

$$\int_{-1}^1 \frac{1}{x+1} dx \text{ using Trapezoidal rule with } n=8.$$

(a) Give the table of values:

x	150	152	154	156
$y = \sqrt{x}$	12.247	12.329	12.410	12.496

Evaluate $\int_{150}^{156} \frac{1}{x+1} dx$ using Lagrange's interpolation formula.

(b) Find $\frac{dy}{dx}$ at $x = 1996$ from the following data:

Year	1995	1996	1997	1998
Population (000)	110	112	102	104

(2)

Solve the following set of simultaneous equations by using any one of the following methods.

10

(i) Gauss Jordan Method.

(ii) LU Decomposition Method.

$$8x_1 - 3x_2 + 2x_3 = 20$$

$$4x_1 - 11x_2 - x_3 = 33$$

$$2x_1 + x_2 + 4x_3 = 12$$

Solve the following differential equation by applying 4th order Runge-Kutta method.

$$y'' - 3y' + y^2 = 0 \quad y(0) = 1, y'(0) = 2 \text{ with the step size of } 0.5.$$

Find $y(3.5)$ and $y'(0.5)$.

10

(iii) What is ill conditioned system?

2

(iv) Use Power Method to find the largest eigen value and corresponding eigen vector of the following matrix.

8

$$\begin{bmatrix} 2 & 5 & 0 \\ 0 & 5 & 3 \\ 2 & 0 & 3 \end{bmatrix}$$

Group B

Answer TWO questions

2x10=20

(v) Write the algorithm and executable program to find the root of the equation using Secant Method.

10

(vi) Write a program to evaluate a given integral by using Simpson's 1/3 and 3/8 rule.

10

(vii) Write a computer program for solving the system of linear equations by Gauss elimination method.

10

(2)

Given the data table

x:	1	2	3	4	5
y:	0.5	2	4.5	8	12.5

fit a power-function model of the form $y = ax^b$.

10

10

✓ 7 Solve the equation:

$$2f_{xx}(x, t) = f_t(x, t), 0 < t < 1.5 \text{ and } 0 < x < 4.$$

given the initial condition:

$$f(x, 0) = 50(4-x), 0 \leq x \leq 4$$

and the boundary conditions:

$$f(0, t) = 0, 0 \leq t \leq 1.5$$

$$f(4, t) = 0, 0 \leq t \leq 1.5$$

8(a) How would you decide the two initial values that are required for using bisection method? Discuss.

8(b) What are eigenvalue problems? How are they different from boundary-value problems?

Group B

2x10=20

Answer TWO questions.

9. Write a C/C++ program to find root of a non-linear equation by secant method. Also, write algorithm for it.

C/C

10. Write an algorithm, a C/C++ program to solve a system of linear equations using simple Gaussian elimination method.

11. Write an algorithm, flowchart and program in C/C++ to compute the interpolation value at a specified, given a set of data points using the Lagrange interpolation.