Second Year/ Third Semester

Subject : Computer Architecture **FM : 80**
Time : 3 hours **PM : 32**

Candidates are required to give their answers in their own words as for s practicable.
The figures in the margin indicate full marks.

Year: 2066

Section A
Long answer question

Attempt any two questions: (2 x 10 = 20)

1. Explain the different types of addressing modes and compare each other.
2. What are the major differentiating between I/O bus & Interface modules? What are the advantage & disadvantages of each?
3. What are the three possible modes to transfer the data to & from peripherals? Explain.

Section B
Short Questions:

Attempt any ten questions :(10 x 6 = 60)

4. Differentiate between parity checker & parity generator.
5. What do you mean by shift micro-operations? Explain.
6. Explain the computer instructions with example.
7. Mention the types of interrupt with example.
8. What do you mean by field decoding? Explain.
9. Write down the following equation in three address, two address & one address instruction. Y = AB + (C * D) + E (F/G)
10. Explain the characteristics of RISC & CISC.
11. Explain the booth Algorithm with example.
12. What is the main function of DMA? Mention the three possible DNA configurations.
13. What are the different types of I/O commands? Explain.
14. Differentiate between associative page table & page replacement.
15. Write short notes on the following:
    a) Memory space b) Address space

Year: 2067

Section A
Long answer question

Attempt any two questions: (2 x 10 = 20)

1. Explain the Microprogram sequencer with examples.
2. Explain with example of Data manipulation instructions.
3. Explain the non restoring Division algorithm, flowchart Hardware Implementation with example.

Section B

Source: www.csitnepal.com

csitnepal

Short Questions:

Attempt any ten questions :(10 x 6 = 60)

4. What do you mean by Instruction format? Explain.
5. Differentiate between Hardwired &Microprogram control unit.
6. What do you mean by logic microoperations?
7. Differentiate between direct & indirect addressing modes.
8. Explain with example of Data transfer instructions.
9. What is the major difference between RISC & CISC architecture?
10. Explain the subtraction algorithm with signed 2's complement.
11. Differentiate between isolated I/O & Memory Mapped I/O.
12. What is DMA transfer? Explain.
13. What is the role of input-output processor (IOP) in computer system? Explain.
14. What is the memory management hardware? Explain.
15. Write short notes on the following:

a. Sequential memory hierarchy
b. Random memory hierarchy

Year: 2068

Section A

Long answer question

Attempt any two questions: (2 x 10 = 20)

1. Explain the restoring division algorithm with example.
2. What do you mean by I/O interface? Explain the I/O bus and interface module.
3. What do you mean by memory organization? Explain the memory management hardware with example.

Section B

Short Questions:

Attempt any ten questions :(10 x 6 = 60)

4. Explain the error detection code with example.
5. Differentiate between logic microoperation and shift microperations.
6. Explain the I/O instruction with example.
7. What do you mean by memory mapping? Explain.
8. What do you mean by control memory? Explain the microinstructions and microoperation format.
9. What do you mean by addressing modes? Differentiate between indexed addressing modes and base register addressing mode.
10. Explain the Booth algorithm. Multiple 3*5 using booth algorithm.
11. Differentiate between isolate and memory mapped I/O.
12. Explain the I/O processor with block diagram.
13. Explain data transfer instruction with example.
14. Differentiate between RISC and CISC processor.
15. Write short notes on the following:
    a) Interrupt cycle
    b) DMA

csitnepal

Tribhuwan University

Institute of Science and Technology

Computer Architecture

2069

Full Marks : 80

Pass Marks : 32

Time : 3 hrs.

Group A

Attempt any two questions : (2*10=20)

1.) Explain the non-restoring division algorithm with example.
2.) What do you mean by Memory system? Explain the characteristics of Memory systems of computer.
3.) Explain the Data transfer and manipulation instruction with example.

Attempt any ten questions :

4.) Differentiate between fixed point representation and floating point representation.
5.) Explain the arithmetic logic shift unit.
6.) What do you mean by computer register and computer instructions? Explain.
7.) Differentiate between Hardwired control and microprogram control unit.
8.) Explain the types of instruction format and compare each of them.
9.) What do you mean by DMA controller? What the three register is used in DMA controller? Explain.
10.) What is virtual memory? What are the major differences between Address space and Memory space?
11.) What do you mean by stock organization? What are the major difference between register stack and memory stack?
12.) Explain the logical and Bit manipulation instruction with example.
13.) What are the characteristics of CISC and RISC processes. Explain.
14.) What do you mean by interface? What are the major differences between I/O bus and memory bus?
15.) Write short notes on the following :
    a.) Parity generator
    b.) Array multiplier

Tribhuwan University

Institute of Science and Technology

Computer Architecture

2070

Full Marks : 80

Pass Marks : 32

Time : 3 hrs.

Group A

Attempt any two questions : (2*10=20)

1.) What is input-output processor (IOP)? Why IOP is needed in Computer System? Explain.
2.) Explain the DMA controller with block diagram. How the DMA interacts with I/O device? Explain.
3.) What in the general model of Microprogram Control Unit? Explain the major steps when you designing of microprogram control unit.

Group B

Attempt any ten questions : (10*6=60)

4.) What is an error detection code? Explain with example.
5.) Design the binary adder-subtractor with example.
6.) Write down the code to evaluate
y=A(B/C-D)+E for one,two and three instruction format.

7.) Mention the different types of data transfer instructions and explain with example.
8.) What are the different types of I/O techniques ? Explain.
9.) Whar are the typical characteristics of RISC instruction set architecture? Explain.
10.) Show the steps of multiplication process using Broth algorithm of the following binary numbers : Y=8*10.
11.) What are the difference between I/O bus and interface modules? Explain.
12.) Differentiate between input-output processor (IOP) and direct memory access (DMA).
13.) Whar are the key characteristics of computer memory system? Explain.
14.) What is the main role of memory management hardware? Explain.
15.) Write short notes on the following :
    a.) Memory Protection
    b.) Address Mapping

Second Year/ Third Semester

Subject : Introduction to Management **FM : 60**
Time : 3 hours **PM : 24**

Candidates are required to give their answers in their own words as for s practicable.
The figures in the margin indicate full marks.

Year: 2066

Group A

1. **Write specific answer to the following questions:** **(1 X 10 = 10)**
   a) Who is the father of Scientific Management?
   b) Write a definition of management?
   c) What is ethics in management?
   d) What is a system?
   e) What do you understand by the principle of Span of Control?
   f) List any three advantages of Line Organisation.
   g) What physiological needs are as described in Maslow's Hierarchy of Needs?
   h) Write any three source of conflict.
   i) What can you understand by '1, 1' in explaining Managerial Grid Theory?
   j) What do you understand by Corporate Social Responsibility>

Group: B

Answer any two questions, but question no 4 is compulsory. **(2 X 10 = 20)**

2. Explain the combination of Administrative Management Theory.
3. Explain the types of planning in detail.
4. Read the case given below carefully & answer the question:
   Ms. Chemjong is General Manager of Nepal Net P. Ltd. There are 65 employees working under her. It is a software development company & about 80% employees are programmers & software engineers, & about 30 % are administrative & support staffs. She is very strict with her administrative & support staffs. She wants all of them to be in their office at specified time & be in the office during their office hour. On the order hand, with programmers & software engineers, Ms. Chemjong is very liberal & friendly. There is no fixed work hour for them & she says that at "the specified time I need output. The rest of the thing related to work is to be decided by you."
   Questions: Defining leadership explain with the help of the situation in the case what type of leadership you find on Ms. Chemjong?

Group: C

Attempt any six questions: **(6 X 5 = 30)**

5. What are the skills required for a manager?
6. Describe internal environment of management.
7. What do you understand by Human Resource Management? Briefly describe.
8. What is contingency approach in management?
9. What is decision making? Explain briefly.
10. Describe briefly the concept of TQM.
11. What do you understand by the term conflict?

Source: www.csitnepal.com

csitnepal

12. Briefly describe the barriers to effective communication.

Year: 2067

Group A

1. **Write specific answer to the following questions:** **(1 X 10 = 10)**
   a. What is the theory developed by Douglas McGregor?
   b. What is leadership?
   c. What is MBO?
   d. What is programmed decision making?
   e. What do you understand by the principle of order under principle of management?
   f. List any three limitations of functional organization.
   g. What is conflict?
   h. What is quality control?
   i. What is flexible plan?
   j. What is Management Information System?

Group: B

Answer any two questions, but question no 4 is compulsory. **(2 X 10 = 20)**

2. Discuss in detail the Corporate Social Responsibility?
3. Describe in detail the Managerial Grid Theory.
4. Read the case given below carefully & answer the question: Mr. Sharma is a Section Officer of District Administration Office (DAO) of Kaski. He is transferred to DAO of Koshi. He is on the process of leaving Kaski. Other employees of Koshi, who have not seen Mr.Sharma before start discussing about Mr. Sharma's character & qualities. They know much information about Mr.Sharma including his weakness in performing assigned tasks.
   Questions: Describing the role of communication, explain how the employees at Koshi might have received the information of Mr. Sharma before his joining that office.

Group: C

Attempt any six questions: **(6 X 5 = 30)**

5. Describe briefly the system concept in management.
6. What role do ethics play in organization? Briefly explain.
7. Describe why planning is important?
8. Discuss what do you understand by decentralization?
9. What do you understand by hierarchy of planning?
10. Briefly describe the contribution of behavior science theory management.
11. Discuss the functions of management.
12. Why quality assurance is important in management? Explain briefly.

Year: 2067

Group A

1. **Write specific answer to the following questions:** **(1 X 10 = 10)**
   a. Who is credited for Hawthorne Studies?
   b. Write a definition of organization.

Source: www.csitnepal.com

csitnepal

c What is Total Quality Management?
d. Write down the functions of HRM.
e. What do you understand by Principle of Unity of Command?
f. List three advantages of Line and Staff Organization.
g. Write any three Hygiene Factors as described in Herzberg's Motivation Hygiene Theory.
h. What is conflict?
i. What is control?
j. What can be understood by '9, 9' in explaining Managerial Grid Theory?

Group B

Answer any two questions, but question no 4 is compulsory. **(2 X 10 = 20)**

2. Explain the System Approach in detail.
3. Discuss in detail the types of planning.
4. Read the case given below carefully and answer the question:
   Mr. Thapa is a Branch Manager of Development Bank. It is a regional bank starting its operation from Surkhet. The bank has its clear policies; the Executive Chairperson of the bank provides close supervision; the salary given to Mr. Thapa meets his daily requirements and other conditions are found satisfactory. Mr. Thapa usually comments on his work environment as follows:
   "I don't like this work as the executive use us to earn money and forbid us to grow. We are being used as a machine and nobody cares about what i want and what i like. They are only concerned to earn money."
   Question: What do you understand by motivation? Explain analyzing the case which motivation theory helps describing Mr. Thapa's behavior.

Group: C

Attempt any six questions: **(6 X 5 = 30)**

5. What is Corporate Social Responsibility? Briefly discuss.
6. Describe the steps in planning.
7. What is programmed and non-programmed decision making? Explain briefly.
8. Describe how conflict can be resolved.
9. Describe the communication process.
10. Why MIS is important for organization?
11. Describe the components of technological environment.
12. What is MBO? Explain briefly.

csitnepal

Tribhuwan University

Institute of Science and Technology

Introduction to Management

2069

Full Marks : 80

Pass Marks : 32

Time : 3 hrs.

Group A (2*10=20)

1.) Write specific answer to the following questions :
   a.) Write four components of internal environment and explain any one of it.
   b.) Make a list of roles of manager in an organization.
   c.) What is MBO? Write down four steps of MBO process.
   d.) What is communication? Write four barriers to communication.
   e.) Define organization and mention its five features.
   f.) Give the meaning of line and staff organization structure. Present the line and staff organization in graphical form.
   g.) What is the theory developed by Douglas McGregor? Draw a figure of hierarchy of Needs in ladder form.
   h.) What do you understand by the principle of Span of Control and principle of authority and responsibility under principles of management?
   i.) Give the full form of QC, TQM, MIS, DSS, PERT, CPM.
   j.) Point out the four barriers to effective communication and the four techniques to improve them.

Group B

Answer any two questions , but question no.4 is compulsory.

2.) Define management. Explain how Hawthorne experiments have contributed to the development of management thought.

3.) What is controlling ? As a manager of an organization, what types of control system would you recommend and why?

4.) Read the case given below carefully and answer the question :

Ravi general manager of a commercial bank believes on management b objective. He used to involve subordinates in planning and decision making. He has given autonomy to his employees to accomplish their job themselves but willing to help if they need. He has been very successful in his activities in this respect. He hired Ashok, a fresh MBA from Kathmandu University. Ashok was posted in the loan department. Ravi motivated Ashok to work independently, maintaining his faith in the philosophy of participative management. He discussed the job assigned to him to be achieved within the specified time. Ashok , however , failed to complete the job in time. Later on, Ravi revised target after consultation with ashok. However, specified targets were not

achieved. Ravi meets Ashok and blames him for his poor performance. He was warned for better performance or ready for termination. Ashok was surprised for a while but later on with courage said, sir, though I like you, but I feel hesitant working with you. I sometimes do not know what to do next. It takes me longer if I could benefit from your experience by having you tell me each day what steps to take next. He further told Ravi that in his previous job also, his supervisors used to help him like that. On hearing this Ravi became wordless and speculated what to do with Ashok.

Questions:

1.) What would you suggest improving Ashok's performance?
2.) Was Ravi's decision to terminate Ashok's was the right way to handle the situation?
3.) Does Ravi should discard his believe in MBO? Give your view.

Group C (6*6=36)

Attempt any six questions :

5.) Explain Behaviorial Science Theory with its contributions and limitations.
6.) What is management ethics? What role does ethics play in organization? Explain.
7.) What is decentralization? Explain its merits.
8.) Why is human resource management important in an organization? Describe briefly its components.
9.) Explain Managerial Grid Theory of Leadership with the help of a figure.
10.) Define Motivation. Explain Maslow's theory of computation.
11.) Define communication. Explain its major barriers.
12.) Discuss the types of control system.

Tribhuwan University

Institute of Science and Technology

Introduction to Management

2070

Full Marks : 80

Pass Marks : 32

Time : 3 hrs.

Group A (2*10=20)

1.) Write specific answer to the following questions :
   a.) What is business environment? Explain about internal environment.
   b.) What is planning? Mention its six features.
   c.) What is line organization and line and staff organization ?
   d.) Write the full form of Q.C., TQM, MBO, MIS, DSS, CPM.
   e.) Write four differences between corporate and tactical plan.
   f.) Mention any two principles of scientific management theory.
   g.) Write any two points of difference between leader and manager. Also mention the three types of leadership.
   h.) What is the gist of x theory and y theory? Write any three assumptions of x theory and y theory.
   i.) What do you mean by HRM? Name the components of HRM.
   j.) List business plans and link them with respective managerial hierarchy.

Group B (2*12=24)

Answer any two questions , but question no.4 is compulsory.

2.) What is management? Describe the functions of management.

3.) What is systems theory of management? Mention the pros and cons of systems theory of management.

4.) Read the case given below carefully and answer the question :

Mr. B M Pradhan, having some experience in production and marketing of paper products, decided to start a small paper industry in Bhaktapur in focusing on production and distribution schools and college level paper products in Kathmandu valley and surroundings. Mr. pradhan needs to face competition with established paper industries like Himal Paper Mills, Everest Paper Industries, Makalu Stationary Products,Kathmandu Paper Industries, Himchuli copy Udyog and others. Mr. Pradhan has knowledge that maximum small paper industries were failed within short duration of their performance due to heavy competition and other reasons. Mr. Pradhan has decided to do a detail analysis of the external environment of the paper industries in order to analyze the opportunities and threats. He also wants to analyze internal factors need to be improved for success in paper business.

   a.) Mention the major areas of environment would be analyzed to success in paper business.

b.) Assess the major barrier to enter in paper industry for a new small firm.
c.) Suggest the essential steps to be taken by Mr. Pradhan to operate and grow paper business.

Group C (6*6=36)

Attempt any six questions :

5.) "Managers have to do lot more than what they are supposed to do" Based on this statement describe the roles managers have to play in an organization.
6.) Explain the Hawthorne studies of Elton Mayo and his colleagues.
7.) Discuss the external environment that influences the organizations ability to attain goals.
8.) Explain the steps involved in planning.
9.) What is decision making? Explain the programmed, non-programmed and strategic decision making.
10.) Explain the Matrix type of organization structure.
11.) Define motivation. How is motivation hygiene concept related to hierarchy theory?
12.) Explain the process of effective communication.

Second Year/ Third Semester

Subject : Numerical Method **FM : 60**
Time : 3 hours **PM : 24**

Candidates are required to give their answers in their own words as for s practicable.
The figures in the margin indicate full marks.

Year: 2066

Attempt all the questions:

1. Define the fixed point iteration method. Given the function $f(x) = x^2-2x-3=0$, rearrange the function in such a way that the iteration method converses to its roots. (2+3+3)

2. What do you mean by interpolation problem? Define divided difference table & construct the table from the following data set. (2+2+4)

X	3.2	2.7	1.0	4.8	5.6
f	22.0	17.8	14.2	38.3	51.7

OR

Find the least squares line that fits the following data.

X	1	2	3	4	5	6
Y	5.04	8.12	10.64	13.18	16.20	20.04

What do you mean by least squares approximation?

3. Derive a composite formula of the trapezoidal rule with its geometrical figure. Evaluate $\int_0^1 e^{-x^2}dx$ using this rule with n=5, up to 6 decimal places. (4+4)

4. Solve the following system of algebraic linear equation using Jacobi or Gauss-seidal iterative method. (8)
$6x_1-2x_2+x_3=11$
$-2x_1+7x_2+2x_3=5$
$X_1+2x_2-5x_3=-1$

5. Write an algorithm & computer program to fit a curve y=ax2+bx+c for given sets of (x_1, y1, g, 0=1,……..,x) values by least square method. (4+8)

6. Derive a difference equation to represent Poisson's equation. Solve the Poisson's equation $\nabla^2 f=2x^2y^2$ over the square to main $0 \leq x \leq 3$, $0 \leq y \leq 3$ with f=0 on the boundary & h=1. (3+5)

7. Define Ordinary Differential Equation of the first order. What do you mean by initial value problem? Find by Taylor's series method, the values of y at x=0.1 & x=0.2 to fine places of decimal form. (2+6)
$\frac{dy}{dx} = x^2y-1$, y (0) =1

Year: 2067

Attempt all the questions:

1. Discuss methods of Half-Interval & Newton's f for solving the non-linear equation f(x) =0. Illustrate the methods by figures & compare them stating their advantages & disadvantages. (8)

2. Derive the equation for Lagrange's interpolating polynomial & find the value of f(x) at x = 1 for the following (4+4)

x	-1	-2	2	4

Source: www.csitnepal.com

csitnepal

f(x)	-1	-9	11	69

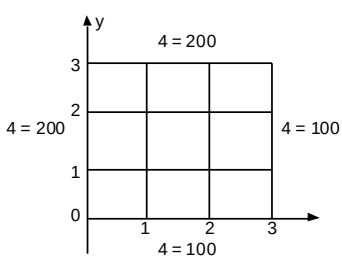
3. Write Newton-cotes integration formulas in basic form for x=1, 2, 3& give their composite rules. Evaluate $\int_0^1 e^{-x2}\,dx$ using the Gaussian integration three point formula. (4+4)
4. Solve the following system of algebraic linear equation using Gauss-Jordan lgorithm. (8)

$$\begin{bmatrix} 0 & 2 & 0 & 1 \\ 2 & 2 & 3 & 2 \\ 4 & -3 & 0 & 1 \\ 6 & 1 & -6 & -5 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \\ x3 \\ x4 \end{bmatrix} = \begin{bmatrix} 0 \\ 2 \\ -7 \\ 6 \end{bmatrix}$$

5. Write an algorithm & computer program to solve system of linear equation using Gauss-Seidal iterative method. (4+8)
6. Explain the Picard's proves of successive approxiamtion. Obtain a solution upto the fifth approximation of the equation $\frac{dy}{dx}$ = y+x such that y=1 when x=0 using Picard's process of successive approximation. (3+5)
7. Derive a difference equation to represent a Laplace's equation. Solve the following Laplace equation. (3 + 5 = 8)

$\frac{\partial 2u}{\partial x2}+\frac{\partial 2u}{\partial y2}$= 0, within 0≤x≤3, 0≤y≤3

For the rectangular plate given as:



OR

Derive a difference equation to represent Poisson's equation. Solve the Poisson's equation $\nabla^2 f=2x^2y^2$ over the square to main 0≤x≤3, 0≤y≤3 with f=0 on the boundary & h=1. (3+5)

Year: 2068

Attempt all the questions:

1. Define the types of errors in numerical calculations. Derive the formula for secant method and illustrate the method by figure. (4+4)
2. Define the linear least squares approximations. Give the data set (x_i,y_i) as

(20.5, 765), (32.7, 826), (51.0, 873), (73.2, 942), (95.7, 1032)

Find the linear least square to fit given data. (2+6)

Source: www.csitnepal.com

csitnepal

3. Evaluate $I = \int_0^1 e^{-x^2} dx$ using trapezodial rule with n=10. Also evaluate the same integral using Grossion 3 point formula and compare the result.
4. Solve the following system of linear equations using Gauss-elimination method (use partial pivoting if necessary): (8)

$2x_2 + x_4 = 0$

$2x_1+2x_2+3x_3+2x_4 = -2$

$4x_1-3x_2 +x_4 = -7$

$6x_1+ x_2- 6x_3- 5x4= 6$

OR

What do you mean by eigen-value, eigen-vector problem? Find the largest eigenvalue correct to two significant digits and corresponding eigen-vectors of the following matrix using power method. (2 + 6)

$$A = \begin{pmatrix} 2 & 4 & 1 \\ 0 & 1 & 3 \\ 1 & 0 & 3 \end{pmatrix}$$

5. Write an algorithm and program to solve system of linear equations using Gauss-Jordan method. (4 + 8)
6. Apply Runge Kutta method of second order and 4th order to find an approximate value of when x=0.2 given that (8)
   $dy = x + y$ and $y(0)=1$.
7. How can you solve Laplace's equation? Explain. The steady-state two dimensional heat flow in a metal plate is defined by $\frac{d^2T}{dx^2} + \frac{d^2y}{dy^2} = 0$.
8. A steel plate of size 30*30 cm is given. Two adjacent sides are placed at 100°C and other sides are held at 0°C. Find the temperature at interior points, assuming the grid size of 10*10 cm. (3+5)

csitnepal

Tribhuvan University
Institute of Science and Technology
2069

✡

Bachelor Level / Second Year/ Third Semester/ Science
Computer Science and Information Technology (CSc. 204)
(Numerical Method)

Candidates are required to give their answers in their own words as far as practicable
The figures in the margin indicate full marks.
Assume suitable data if necessary

Attempt all questions:

1. Derive the formula to solve nonlinear equation using secant method. Using your formula estimate a real root of following nonlinear equation using ... decimal places $x^2 + \ln x = 3$.

2. Estimate $f(3)$ from the following data using Cubic Spline interpolation.

x	1	2.5	4	5.7
$f(x)$	-2.0	4.2	14.4	31.2

OR

Find the best fitting quadratic polynomial from following data using least square approximation.

x	-2	-1.2	0	1	1.2	2.5	3	4.5	6.5
$f(x)$	10.39	2.96	-2.0	-2.63	-2.46	0.83	3.1	12.8	30.4

3. (a) For the function $f(x) = e^x \sqrt{\sin x + \ln x}$ estimate: $f'(6.3)$ and $f''(6.3)$[*takeh* = 0.01]

(b) Evaluate $\int_1^2 (\ln x + x^2 \sin x)\,dx$ using Gaussian integration 3 point formula

4. Solve the following set of equations using Gauss elimination or Gauss Jordan method.

$$3x_1 + 5x_2 - 3x_3 + x_4 = 16$$
$$2x_1 + x_2 + x_3 + 4x_4 = 9$$
$$3x_1 - 4x_2 - x_4 = 1$$
$$2x_1 + x_2 - 3x_3 + 9x_4 = 5$$

(5)

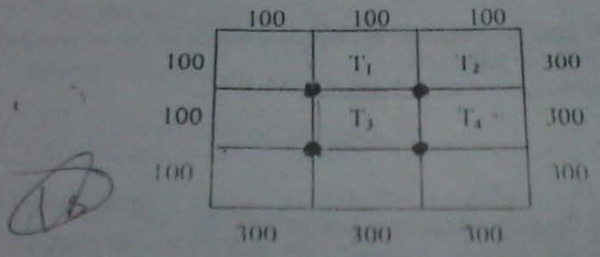
5. How can you solve higher order differential equation? Explain. Solve the following differential within $0 \le x \le 1$ using Heun's method. (3+5)

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2xy = 1 \text{ with } y(0) = 1 \text{ and } y'(0) = 1 (take h = 0.5)$$

CSC204-2069

6. (a) How can you obtain numerical solution of a partial differential equation? Explain. (3)

(b) The steady-state two-dimensional heat-flow in a metal plate is defined by $\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0$. Given the boundary conditions as shown in figure below, find the temperatures at interior points T_1, T_2, T_3 and T_4.



7. Write an algorithm and C-program code to solve non-linear equation using Newton's method. Your program should read an initial guess from keyboard and display the followings if the solution is obtained. (3+7)

- Estimated root of the equation
- Functional value at calculated root
- Required number of iterations

Tribhuvan University
Institute of Science and Technology
2070

Bachelor Level / Second Year/ Third Semester/ Science
Computer Science and Information Technology (CSc. 204)
(Numerical Method)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.
Assume suitable data if necessary.

Attempt all questions:

1. What is bracketing and non-bracketing method? Explain with the help of example. Estimate a real root of following nonlinear equation using bisection method correct up to two significant figures.

$$x^2 \sin x + e^{-x} = 3 .$$

(3+5)

2. Define interpolation. Find the functional value at $x = 3.6$ from the following data using forward difference table.

x	2	2.5	3	3.5	4	4.5
$f(x)$	1.43	1.03	0.76	0.6	0.48	0.39

(2+6)

3. Derive Simpson's 1/3 rule to evaluate numerical integration. Using this formula evaluate

$$\int_{0.2}^{1.2} (x^2 + \ln x - \sin x)\, dx. (take\ \ h = 0.1)$$

(4+4)

What is pivoting? Why is it necessary? Explain. Solve the following set of equations usi Gauss elimination or Gauss Seidel method.

$$x_1 + 10x_2 + x_3 = 24$$

$$10x_1 + x_2 + x_3 = 15$$

$$x_1 + x_2 + 10x_3 = 33$$

(3+

3. Derive Simpson's 1/3 rule to evaluate numerical integration. Using this formula evaluate

$$\int_{0.2}^{1.2}(x^2 + \ln x - \sin x)dx. (take\ h = 0.1)$$

(4+4)

4. What is pivcting? Why is it necessary? Explain. Solve the following set of equations using Gauss elimination or Gauss Seidel method.

$$x_1 + 10x_2 + x_3 = 24$$
$$10x_1 + x_2 + x_3 = 15$$
$$x_1 + x_2 + 10x_3 = 33$$

(3+5)

Compare Euler's method with Heun's method for solving differential equation. Obtain $y(1.5)$ from given differential equation using Runge-Kutta 4th order method.

$$\frac{dy}{dx} + 2x^2y = 1, \text{ with } y(1) = 0 \quad (\text{Take } h = 0.25).$$

(4+8)

OR

1CSc. 204-2070

Solve the following boundary value problem using shooting method.

$$\frac{d^2y}{dx^2} - 2x^2y = 1, \text{ with } y(0) = 1 \text{ and } y(1) = 1 \text{ (Take } h = 0.5).$$

(8)

6. Solve the equation $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 3x^2y$ over the square domain $0 \le x \le 1.5$ and $0 \le y \le 1.5$ with $f = 0$ on the boundary. (take $h = 0.5$).

(8)

7. Write an algorithm and C-program to approximate the functional value at any given x from given n no. of data using Lagrange's interpolation.

(5+7)

Second Year/ Third Semester

Subject : Object Oriented Programming **FM : 60**
Time : 3 hours **PM : 24**

Year: 2066

Section: A

Attempt any two questions: (2x10=20)

1. Explain in detail the following principles of object oriented programming.
   i) Data encapsulation & Data hiding
   ii) Inheritance & Polymorphism
   iii) Abstraction
2. Why constructor & destructor are required in the Object Oriented Programming? Explain with suitable example.
3. Define a **Student** class (with necessary constructors and member functions) in Object Oriented Programming (abstract necessary attributes and their types). Write a complete code in C++ programming language)
   - Derive Computer Science & Mathematics classes from student class adding necessary attributes. (at least three subjects)
   - Use these classes in a main function and display the average marks of computer science & mathematics students.

Section: B

Attempt any eight questions: (8 x 5=40)

4. What is type casting? Explain with suitable example.
5. Write a program to perform subtraction of two complex numbers using operator overloading.
6. Why exception handling is required? Explain with suitable example.
7. Differentiate between super class & sub class with suitable example.
8. Write a program in C++ to count the number of words in a line of text.
9. Differentiate between function overloading and function overriding. Explain with suitable example.
10. Explain the rule of polymorphism in OOP.
11. Explain the different types of class access specifiers.
12. Write a program to find the cube of given integer using inline function.
13. Write a program to convert Centigrade into Fahrenheit temperature.

Year: 2067

Section: A

Attempt any two questions: (2x10=20)

1. Discuss the feature of Object-Oriented Programming? Differentiate between Object Oriented Programming & Procedural Based Programming.
2. What is constructor? Explain their types. Discuss user defined parameterized constructor with suitable example.

csitnepal

3. Define a **Clock** class (with necessary constructor& member functions) in OOP (abstract necessary attributes & their types). (Write a complete code in C++ programming language).
    - Derive **Wall_Clock** class from **Clock** class adding necessary attributes.
    - Create two objects of **Wall_Clock**class with all initial state to 0 or NULL.

Section: B

Attempt any eight questions: (8 x 5=40)

4. How can you classify objects? Why Dynamic object is needed?
5. What is operator overloading? Explain their type with suitable examples.
6. Why type conversion is necessary in **OOP?** Explain with example, the type conversion routine.
7. What is Inheritance? Explain their types with suitable examples.
8. What is Friend Function? Why it is used in **OOP**? Explain with an example.
9. What is Container class? Differentiate container class from inheritance.
10. Explain the role of virtual function in **OOP.**
11. Explain about "**this**"pointer with suitable example.
12. WAP to find the square of given integer using inline function.
13. WAP to convert feet into meter.

Year: 2068

Section: A

Attempt any two questions: (2x10=20)

1. What are the main features of the Object Oriented Programming? Explain with suitable practical examples.
2. Explain the role of constructor and destructor in Object Oriented Programming. Discuss user defined parameterized constructor with suitable example.
3. Define a Shape class (with necessary constructors and member functions) in Object Oriented Programming (abstract necessary attributes and their types). (Write a complete code in C++ programming language)
    - Derive Triangle and Rectangle classes from Shape class adding necessary attributes.
    - Use these classes in main function and display the area of triangle and rectangle.

Section: B

Attempt any eight questions: (8 x 5=40)

4. Why dynamic object is needed? Explain with suitable example.
5. What is function overloading? Explain with suitable example.
6. Write a C++ program containing a possible exception. Use a try block to throw it and a catch block to handle it properly.
7. Differentiate between base class and derived class with suitable examples.
8. Differentiate between private, public and protected variables with suitable example.
9. Differentiate between class from inheritance. Explain with suitable example.
10. Explain th role of polymorphism in Objected Oriented Programming.
11. Explain about "this" pointer with suitable example.
12. Write a program to find the square root of given integer using inline function.
13. Write a program to convert inch into centimeter.

csitnepal

Tribhuwan University

Institute of Science and Technology

Object Oriented Programming

2069

Full Marks : 60

Pass Marks : 24

Time : 3 hrs.

Section A

Attempt any two questions : (2*10=20)

1.) Differentiate between structural programming approach and object oriented programming approach. Explain the inheritance, polymorphism with example.
2.) How is a member function of a class defined? Define friend function. What are the merits and demerits of using friend function? Explain.
3.) Define constructor, list some of the special properties of the constructor functions.

Section B

Attempt any eight questions : (8*5=40)

4.) Explain the do|while structure.
5.) Explain the inline function with example.
6.) How is dynamic initialization of objects achieved?
7.) What are the importance of destructors?
8.) What is an operator function? Explain with syntax.
9.) Explain with example, how you create space for array of object using pointers?
10.) Explain the features of I/O system supported by C.
11.) Differentiate between overloaded functions and function template.
12.) What are the main advantages of using exception handling mechanism in a program.
13.) What are the major differences between …… and loading of function.

Tribhuwan University

Institute of Science and Technology

Object Oriented Programming

2070

Full Marks : 60

Pass Marks : 24

Time : 3 hrs.

Section A

Attempt any two questions : (2*10=20)

1.) Write any four features of object-oriented programming. Differentiate between operator overloading and function overloading.
2.) Why do we need the preprocessor directive # include < io stream >? Describe the major parts of a C++ program .
3.) What do you mean by overloading of a function? When do we use this concept? Explain with example.

Section B

Attempt any eight questions : (8*5=40)

4.) What do you mean by dynamic initialization of variables?
5.) Explain with example of an inline function.
6.) What is virtual function? Explain.
7.) Differentiate between structure and class in terms of access modifier.
8.) What are the characteristics of constructor?
9.) Differentiate between overriding vs overloading.
10.) Explain the function templates with example.
11.) How can we define our functions inside the namespace and use them outside?
12.) Write the syntax and use of get line () and write () functions.
13.) Explain the friend function with its syntax.

Second Year/ Third Semester

Subject : Operating System **FM : 60**
Time : 3 hours
PM : 24

Year: 2066

Section: A

Attempt any two questions: (2x10=20)

1. Define the term semaphore. How does semaphore help in dining philosophers problem?
2. Explain how file allocation table (FAT) manages the files. Mention the merits & demerits of FAT system. A 200 GB disk has 1-KB block size, calculate the size of the file allocation table if each entry of the table to be 3 bytes.

OR

Suppose that a disk has 100 cylinders, numbered 0 to 99. The drive is currently serving a request at cylinder 43, & previous request was at cylinder 25. The queue of pending request, in FIFO order is: 86, 70, 13, 74, 48, 9, 22, 50, 30

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending request for each of the following disk scheduling algorithms?

a) FCFS
b) SCAN

3. Write short notes on :
   a) Least recently used page replacement algorithm
   b) Segmentation
   c) Associative memory

Section: B

Attempt any eight questions: (8 x 5=40)

4. What is an operating system? Differentiate between time sharing & real time operating system.
5. Why thread is necessary? In which circumstances user-level thread is better than Kernel level thread?
6. Explain about hierarchical directory system systems with diagrammatic examples.
7. How can you define the term process scheduling? Differentiate between I/O bound process & CPU bound process.
8. A system has two process & 3 resource s. Each process needs a maximum of two resources, is deadlock possible? Explain with answer.
9. What do you mean by interrupt? Explain the working mechanism of interrupt controller.
10. Define the term indefinite postponement. How does it differ from deadlock?
11. Explain the maping of virtual address to real address under segmentation. Compare the throughput (overall performance) of SCAN with SSTF.

Source: www.csitnepal.com

csitnepal

Year: 2067

Section: A

Attempt any two questions: (2x10=20)

1. What is System Calls? Explain the system call flow with the help of a block diagram.

OR

What do you mean by file systems? What are the major difference between file system interfaces & file system implementation? Explain.

2. Write short notes on:
   a. Disk Scheduling Algorithms.
   b. Error Handling & Formatting.
   c. File Operations
3. Consider the following 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 the LRU replacement, FIFO replacement, & optimal replacement algorithms? Assuming three, five, or seven frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

Section: B

Attempt any eight questions: (8 x 5=40)

4. Differentiate between personal computer operating systems & mainframe operating systems.
5. When do page fault occur? Describe the actions taken by an OS when a page fault occurs.
6. List four necessary conditions for deadlock. Explain each of them briefly what would be necessary (in the operating system) to prevent the deadlock.
7. Draw & describe the 3-state process model.
8. Does window have any concept of process hierarchy? How does parent control the child?
9. What is the problem with thread implementation in user space when any of the threads get blocked while performing I/O operation?
10. Explain why two level & scheduling is commonly used.
11. What are the main motivations & issues in primary memory management?
12. Explain the disk management with example.

Year: 2067

Section: A

Attempt any two questions: (2x10=20)

1. List the essential properties for the Batch-Oriented and Interactive operating system. For each of the following application which system (Batch or Interactive) is more suitable? State the reson.
   a) Word processing.
   b) Generating monthly bank statements
   c) Computing pi to milling decimal places
   d) A flight simulator
   e) Generating mark statement by University

OR

Source: www.csitnepal.com

csitnepal

"Using Semaphore is very critical for programmer" Do you support this statements? If yes, prove the statement with some fact. If not, put your view with some logical facts against the statement."

2. Round-robin scheduling behaves differently depending on its time quantum. Can the time quantum be set to make round-robin behave the same as any of the following algorithms?
   If so how? Proof the assertion with an example.
   a) FCFS
   b) SJF
   c) SRTN
3. A disk has 8 sectors per track and spins at 600 rpm. It takes the controller time 10 ms from the end of one I/O operation before it can issue a subsequent one. How long does it take to read all 8 sectors using the following interleaving system?
   a) No interleaving
   b) Single interleaving
   c) Double interleaving

Section: B

Attempt any eight questions: (8 x 5=40)

4. What is critical section problem? Why executive critical section must be exclusive? Explain.
5. What must user program be prohibited from writing to the memory locations containing the interrupt vector?
6. What are the difference between the trap and interrupt? What is the use of each function?
7. What is deadlock? State the conditions necessary for deadlock to exit. Give reason, why all conditions are necessary.
8. A Computer with 32-bit address uses a two-level table. Virtual address are split into a 9-bit top level page table field, 11-bit second-level page table field and offset. How large the pages? How much maximum space required when pags tables loaded into memory of each entry required 4 byte.
9. What do you mean by memory fragmentation? Distinguish between the internal and external fragmentation.
10. Under what circumstances do page fault occur? Describe the action taken by operating system when page fault occurs.
11. How many bits would be needed to store the free-space list under the following condition if a bitmap were used to implement?
    a) 500,000 blocks total and 200,000 free blocks.
    b) 1,000,000 blocks total and 0 free blocks.
    Also find how much space is required if it need to be stored in memory.
12. Which one suited, polling/interrupt, for the following types of system? Give reason.
    a) A system dedicated to controlling single I/O devices.
    b) A work station running as heavily used web serveer.

csitnepal

Tribhuwan University

Institute of Science and Technology

Operating System

2069

Full Marks : 60

Pass Marks : 24

Time : 3 hrs.

Section A

Attempt any two questions : (2*10=20)

1.) Define the essential properties of following types of operating systems:
   a.) Batch
   b.) Interactive
   c.) Time sharing
   d.) Real time
   e.) Handheld

OR

Why some process requires high priority? What would happen if all processes have some the priority? Mention merits and demerits of assigning priority on process.

2.) Given references to the following pages by a program,
0,9,0,1,8,1,8,7,8,7,1,2,8,2,7,8,2,3,8,3
How many page faults will occur if the program has three page frames for each of the following algorithms?
   a.) FIFO
   b.) Optimal
   c.) Second chance
   d.) LRU

3.) For the processes listed in the following table, draw a Gantt chart illustrating their execution and calculate the average waiting time using :
   a.) First-Come-First-Serve
   b.) Short-Job-First
   c.) Shortest-Remaining-Time-Next
   d.) Round-Robin (quantum = 2)
   e.) Round-Robin (quantum = 1)

Processes	Arrival time	Burst Time
A	0.00	4
B	2.01	7
C	3.01	2
D	3.02	2

Section B

Attempt any eight questions :

4.) Explain the Peterson's concept for the solution of critical section problem.
5.) Show how sleep and wake up solution is better than busy waiting solution for the critical section problem.
6.) Describe how multithreading improves performance over a single threaded solution.
7.) Explain how priority scheduling works . In how many ways can priority be assigned?
8.) What do you mean by deadlock prevention? Mention the mechanism for deadlock prevention.
9.) Two separate systems one implemented in bitmap and another in linked list to manage the fragmentation of 256 MB memory. For bitmap, allocation units are of 512 bytes. For linked list, each holes or segments are of 32 KB, and each node in the list needs a 32 bits. How many bytes of storage is required for each method? Which one is better in terms of memory spare required?
10.) Distinguish between the paging and segmentation. Why many systems use the combination of both?
11.) Compare the bitmap and linked list implementation of disk free-space management. How much space required in memory to store bitmap for 20 GB hard disk with 2KB block size.
12.) How does DMA increase system concurrency? How does it complicate the hardware design?

Tribhuwan University

Institute of Science and Technology

Operating System

2070

Full Marks : 60

Pass Marks : 24

Time : 3 hrs.

Section A

Attempt any two questions : (2*10=20)

1.) For the processes listed in following table, draw a Gantt chart illustrating their execution using :
   a.) First-come-First-Serve
   b.) Short-Job-First
   c.) Shortest-Remaining-Time-Next
   d.) Round-Robin (quantum=2)
   e.) Round-Robin (quantum=1)

Processes	Arrival Time	CPU Time
A	0.000	3
B	1.001	6
C	4.001	4
D	6.002	2

What is the turn around time for each algorithm ?

OR

What do you mean by disk management? What are the major differences between error handling and formatting.

2.) How many page faults occur for each of the following page replacement algorithm for the reference string 0172327103 with four page frames and eight pages. Suppose all frames are initially empty.
   a.) Optimal replacement
   b.) FIFO replacement
   c.) LRU replacement
   d.) Clock replacement

3.) Suppose that the disk drive has 50 cylinders, numbered from 0 to 49. The drive currently serving the request at cylinder 20 and the previous request was at cylinder 25. The queue of pending request is 10, 22, 20, 2,40, 6 and 38 in the order. A seek takes 6 msec per cylinder moved. How much seek time is needed for the following disk-scheduling algorithms?
   a.) First-Come, First-Served
   b.) Shortest Seek Time First
   c.) SCAN
   d.) LOOK

Section B

Attempt any eight questions : (8*5=40)

4.) Define the essential properties of following types of operating systems.
    a.) Batch
    b.) Interactive
    c.) Time Sharing
    d.) Real Time
    e.) Handheld
5.) Describe how multithreading improves performance over a singled-threaded solution.
6.) "Using Semaphores is very critical for programmer". Do you support this statement? If yes, prove the statement with some fact. If not, put your view with some logical facts against the statement.
7.) Students working at individual PCs in a computer laboratory send their files to be printed by a server which spools the files on its hard disk. Under what conditions may a deadlock occur if the disk space for print spool is limited? How may the deadlock be avoided?
8.) What are Segmentation and Paging? Why they are sometimes combine into one scheme?
9.) What are the differences between the trap and interrupt? What is the use of each function?
10.) What is "device independence"? Define.
11.) Explain how file allocation table (FAT) manages files. Mention the merits and demerits of using FAT.
12.) Write short notes on (any two):
    a.) System programs
    b.) Race condition
    c.) Windows file system