CSIT Questions Collections 2068

First Year/ First Semester

First Year/ First Semester

Subject : Physics I **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: 2065

Section A
Long answer question

1. What is meant by Galilean invariance? Show that distance and acceleration are invariant to Galilean transformation, velocity is not invariant. (2+1.5+1.5+2)
2. It is given that the potential energy of a system is rotationally invariant. What do you mean by rotational invariance? Show that angular momentum is conserved for such a system. (3.5+3)
3. (a) Discuss the analogy between liquid-flow and current-flow and hence, derive an expression for liquid-flow through capillaries in series. (4)
   (b) State Gauss's law and use it to show that excess charge of a charged conductor resides on its outer surface. (3)
4. (a) Discuss the analogy between liquid-flow and current-flow and hence, derive an expression for liquid-flow through capillaries in series. (4)
   (b) State Gauss's law and use it to show that excess charge of a charged conductor resides on its outer surface. (3)
5. Derive the expression for energy density in the magnetic field. (7)
6. Explain the empirical basis for writing the Maxwell's equations and write them. (7)

Section B
Short answer Questions:

Answer any eight:

7. A proton is accelerated through a potential difference 50V and then it is allowed cross a field free region 7.5m long. Find the time required to cross this distance. (4)
8. Find the height of geostationary satellite (as viewed by an observer on the earth's surface); given g=9.8 ms^{-2}on the earth's surface, R= 6.38 x 10^5m. (4)
9. The potential energy for the Vander Waals force between two atoms is given by U(X) =$\frac{a}{x^{12}} - \frac{b}{x^6}$, where x is the distance between the atoms and a and b are positive constants. Calculate the force between the two atoms and plot it against x.(4)
10. A parallel LCR circuit has L= 8mH, C= 10 μF and R= 0,5Ω. Calculate the natural frequency and quality factor. (4)
11. A water drop of radius 0.01 mm is falling through air neglecting the density of air as compared to the water, calculate the terminal velocity of the drop (η for air = 1.8 x 10^{-4} CGS units) (4)
12. Two point charges of and -$\frac{q}{2}$ are located at the origin and at (a, 0, 0) respectively. Find the point where electric field vanishes. (4)

13. Two parallel conducting platees are separated by the distance d and potential difference $\Delta\psi$. A dielectric slab of dielectric constant k is and of uniform thickness is tightly fitted between the plates. Find the electric field in the dielectric. (4)
14. What is the capacitance of a capacitor that can store 800 J at 800 V? Suppose the capacitor has parallel plates separated by 10^{-5} m and filed with a dielectric of dielectric constant 2.2. What is the area of the plates? (4)
15. Consider a simple RL circuit in which a sudden voltage V is applied. Discuss its transient behavior and find the current as a function of time.
16. Show that the time average power dissipation in a circuit which carries an AC current $l(t) = l_0 e^{iwt}$ and $V(t) = zl(t)$ is $\bar{P} = \frac{1}{2}|l_0||V_0|Cos\theta$. Here z is the impedance of the circuit: $Z = |Z|e^{1ß}$ (4)

Year: 2066

Section A

Long Answer Questions:

Answer any four:

1. Write the law of conservation of momentum and the law of conservation of energy. Write Galilean transformation. Show that the laws of conservation of momentum and of conservation of energy are invariant under Galilean transformation. (2+1+4)
2. Write and explain Bernoulli's theorem giving two practical examples. Deduce Bernoulli's equation. (1+2±2+2)
3. (a) Given the sum of external forces acting upon a system of particles equals zero, show that the total angular momentum remains constant. (4)
   (b) Write Gauss's law for a system of charges in vacuum. Modify this law for the case when the some charges are in medium of dielectric constant K. (1.5+2)
4. Derive the expression for energy density in electric field. (7)
5. Derive ∇ x $\underset{E}{\rightarrow}$= -—which constitutes one of the Maxwell's equation. (7)

Section B

Short Answer Questions:

Answer any eight:

6. Calculate the magnitude of centripetal force acting on a mass 100g placed at a distance 0.2m from the center of a rotating disk with 200 rpm. (4)
7. Given g = 9.81 ms^2, radius of earth = 6.38 x 10^6m and gravitational constant (G=6.6 x $l0^{-11}$ m^3 Kg s^{-2}. Calculate the mass of the earth and time of revolution of asatellite in a circular orbit near the earth surface. (2+2)
8. A charged particle moving along x — axis enters a region in which a constant electric field is along y — axis and a constant magnetic field is along z — axis. What is the condition that the net force acting on the charge is zero? (4)
9. A particle in Simple Harmonic Motion. Show that the total energy of the particle is constant. (4)
10. In an experiment with Poiseuille's apparatus the volume of water coming out per second is 8 cm^3through a tube of length 0.62 m and of uniform radius *0.5* mm. The pressure difference between the two ends of the tube is equal to 3.1 cm of Hg. You can use the Poiseuille's formula to calculate the coefficient of viscosity $Q = \frac{\pi r^4 P}{8^{\eta} l}$ (4)

11. Two point charges have charge q_1= 2.0 x 10^{-8} C and q_2=-0.7 x 10^{-8} C respectively. The charges are placed 2 cm apart. Find force between the charges. (4)
12. An electron having kinetic energy 3.0 x 10^{-17} J enters a region of space containing a uniform electric field E = 800 vm^{-1}. The field is parallel to the electron's velocity and decelerates it. How far does the electron travel before it comes to rest? (4)
13. A straight metal wire of length *1* is moved in a magnetic field $\overrightarrow{B}$ with velocity $\overrightarrow{v}$. Consider the Lorentz force acting electrons in the wire and show that the potential difference across the wire is $\overrightarrow{B}.\overrightarrow{l}x\overrightarrow{v}$ (4)
14. A capacitor C, a resistor R and a battery arc connected in series with a switch. The switch is closed at time t = 0. Set up the differential equation governing charge on the capacitor and find the charge as a function of time. (4)
15. Calculate the energy density of uniform magnetic field of strength 1 Tesla in vacuum- [$\mu 0=4\pi x10^{-7} h/n$] (4)

Year: 2067

Section A

Long Answer Questions:

Answer any four:

1. A reference frame rotates with respect to another inertial reference frame with uniform angular velocity w. The position, velocity and acceleration of a particle in the inertial frame of reference is $\vec{R}$, $\vec{v}$ and $\vec{a}$. Find the acceleration of the particle in the rotating frame of reference.
2. Consider a system with potential energy $U(\vec{r})$
   a) Show that force acting on the system is given by $\vec{F}(\vec{r}) = \nabla U(\vec{r})$.
   b) For the system above it is given that $U(\vec{r})$ is translationally invariant i.e. $U(\vec{r}_0 + \vec{r}) = U(\vec{r}_0)$. Show that linear momentum of the system is conserved. (3.5 +3.5)
3. a) State the assumptions made in deducing Stoke's law for the motion of a small sphere in a viscous medium. Use dimensional arguments to derive Stoke's law. (3.5)
   b) Define dipole moment and derive expression for electric field of a dipole. (3.5)
4. Discuss and derive the boundary conditions imposed on the field vectors $\vec{E}$ and $\vec{D}$ at the interface of two dielectric media. (7)
5. Use Maxwell's equations to derive wave equation for electric and magnetic field. (7)

Section B

Short Answer Questions:

Answer any eight:

6. The initial position of a particle of mass 100g is $\vec{r}_0 = 3\hat{j} + 2\hat{k}\ m$ and its initial velocity is $\vec{u} = 3\hat{c} + 0.1\hat{k}$ ms^{-1}. A force $\vec{F} = 1\hat{\imath} + 0.75\,\hat{j}$ N acts upon the particle for 5 sec. Obtain the final velocity and final position. (4)
7. An electron describes a helix of radius 0.2 m and pitch 0.03 cm in a magnetic field of 50 gauss(104 gauss = 1 Tesla). Calculate the components of its velocity alloy and Perpendicular to the field. (4)
8. A satellite of m is revolving around the earth in a circular orbit of radius r = R + h, where R is the radius of the earth and h is the height of the satellite above earth's

surface. Calculate the angular momentum of the satellite about the center of the earth. (4)

9. An LC circuit oscillates with a frequency of 200 Hz. The capacitance in the circuit is 10 μF. What is the value of the inductance?
10. Two horizontal capillary tubes A and B are connected together in series so that a steady stream of liquid flows through them. A is 0.4 mm in internal radius and 250 cm long while B is 0.3 mm in internal radius and 40 cm long. The pressure of the fluid is 7.5 cm of Hg above the atmospheric pressure at the entrance point of A. At the exit point of B the pressure is atmospheric (76 cm of Hg). What is the pressure at the junction of A and B?
11. The screened coulomb potential $V = \frac{f}{4\pi\epsilon_0 r} e^{\frac{r}{a}}$ is very common in a conducting medium. Calculate the corresponding electric field and charge density. (4)
12. A plane slab of material with dielectric constant K has air on both sides. The electric field in air is E_0 and it is uniform and perpendicular to the boundaries. Find the field inside the dielectric. (4)
13. Two identical air capacitors are connected in series and the combination is maintained at a constant voltage 50v. A dielectric sheet of dielectric constant 6 and thickness equal to the –sixth of the air gap is now inserted into one of the capacitors. What is the voltage across that capacitor? (4)
14. Show that magnetic field energy of a system of currents is given by $U = \frac{1}{2}\int_v \vec{J}.\vec{A}\ dv$ where $\vec{J}$ is current density, $\vec{A}$ is vector potential and dv is the volume element. The integration is carried over volume.
15. A capacitor C, a resistor R and a battery of voltage V_0 are connected in series with a switch. The switch is closed at time t =0. Set up the differential equation for charge of on the capacitor and determine it as a function of time.

Year: 2068

Section A

Long Answer Questions:

Answer any four:

1. What are non-inertial frames of reference? Define and explain centrifugal and Coriolis forces. (2-1.2+3)
2. State and explain law of conservation of angular momentum. Also state and explain Kepler's 2nd law. (1+2+1+3)
3. What do you mean by a harmonic oscillator? Discuss the oscillation of diatomic molecule. Hence sketch the energy level diagram. (2+4+1)
4. Discuss the boundary conditions on the field vectors E and D? (3.S+3.5)
5. Explain the meanings of power and power factors. Further discuss the phenomena of resonance and hence obtain quality factor. (2+2+2+1)

Group B

Short Answer Questions:

Answer any Eight:

6. A proton is acceierated through a p.d. 50 and then it is allowed to cross a field free r ion 7.5m long. Find the time required to cross this distance. (4)
7. The intial positions of two particles are (-2, 0) and (0, -2) and they start simultaneously along the axes of x and y with uniform velocities 3i cm/s and 4j

cm/s respectively. Obtain the vector representing the position of the 2nd particle with respect to the first as a function of time.- (4)

8. Show that the force defined by F = („2 x2 + 2xyj is conservative. (4)
9. A particle of mass 5 gm lies in a potential field V = (8x2 + 200) ergs/gm. Calculate its time period. (4)
10. Calculate the mass of water flowing in 10 minutes through a tube 0.1 cm in diameter 40 cm long, if there is a constant pressure head of 20 cm of water. (11 for water = 0.0089 cgs units). (4)
11. Two small identical conducting spheres have charges of 2.0 x 10-9 C and -0.5 x10" C, respectively. When they are placed 4 cm apart, what is the force between them?(4)
12. Find the electric field produced by a uniformly polarized sphere of radius R. (4)
13. Find the energy of a uniformly charged spherical shell of total charge 9 and radius R. (4)
14. A real capacitor C has a parallel leakge resistance R; it is connected in series with an ideal inductance L. Calculate JZI; find the approximate values at high and low frequencies assuming R is large. (2+2)
15. Calculate the energy density of uniform magnetic field of strength I Tesla invacuum. (p0=4 x1o7Ns2/z) (4)

First Year/ First Semester

Subject : Introduction of Information Technology **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: 2065

Long Questions:

Attempt any two questions: (2x10=20)

1. Explain the major functions of digital computers
2. Explain the first, second and third normal form and compare it.
3. What do you mean by Intranet? Explain the advantages and disadvantages of Intranet.

Short Questions:

Attempt any eight questions: (8x5=40)

4. What do you mean the speed of a computer?
5. What do you mean by super computer?
6. What is an auxiliary storage device?
7. What are the different types of software?
8. What do you mean by multitasking?
9. Differentiate between high level language and low level language.
10. What are the advantages of using a database?
11. What are the different types of network architectures?
12. How can you define the addresses on the Internet?
13. What are the components of a data warehouse?

Year: 2066

Attempt any two questions

1. Explain the CPU and its working principle.
2. Explain how a distributed data processing system works.
3. Explain the network topology. What are the different types of network topologies?

Short Questions

A Attempt any eight questions:

4. What are the different kinds of output devices?
5. What is an application software?
6. What is the advantage of graphical user interface (GUI)?
7. What do you mean by multitasking?
8. Differentiate between compilers and Interpreters.
9. What do you mean by HTTP and how does it work?
10. What are the components of data warehouse?
11. Explain the different types of computer network.
12. Describe the communication processor.
13. What are the major disadvantages of distributed data processing?

Year: 2067

Attempt any two questions:

1. What do you mean by Internet? Explain the advantages and disadvantages of Internet.
2. Explain the functions of an Operating System.
3. What are the major Characteristics of Computer? Explain.

Short Questions

Attempt any eight questions

4. What is the function of memory?
5. Describe the working principle of processor.
6. Differentiate between random access devices and sequential access device.
7. What are the different kinds of input devices?
8. What is System Software?
9. What do you mean by multiprocessing?
10. Differentiate between third generation language and fourth generation languages .
11. What do you mean by normalization?
12. What do you mean by TCP/IP and how does it work?
13. What are the major characteristics of the Intranet?

Year: 2068

Attempt any two questions:

1. Explain how the CPU and memory work with suitable diagram. Compare between CISC and RISC architecture in brief.
2. Differentiate between centralized Data processing system and Distributed Data Processing System. State advantages and disadvantages of distributed systems.
3. Explain about Internet and Intranet. List some activities that you can do on the Internet. Describe, how the World Wide Web is different from the Internet?

Short Questions:

Attempt any eight questions:

4. Distinguish among the four kinds of computer systems.
5. Define RAM, ROM, PROM, and EPROM.
6. What are the features of today's software applications? Explain.
7. What is the difference between sequential and direct-access file processing?
8. Explain the meaning of up-link, down-ling and cross-link.
9. How will you compose, reply and forward an e-mail message?
10. What is GIS? What are the components of GIS? How GIS works?
11. Explain CAD? CAM system.
12. Highlight on Computers in Education and training in brief.
13. Write shore notes on (any two):

a) Compiler and Interpreters
b) MICR, OCR and OMR
c) Data Normalization

First Year/ First Semester

Subject : Fundamental of Computer Programming **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Attempt all questions. All question carry equal marks.

1. Draw the flow chart for finding largest of three numbers and write an algorithm and explain it.
2. Find the value of "a" in each of the following statements.
   Int i=3 , j=4, k=8;
   Float a =4.5, b = 6.5, c = 3.5;
   (a) a = b –i/k+ c/k
   (b) a = (b-k)/j + (j+c)/k
   (c) a=c-((i+j)/(k+i))*b
   (d) a=c –i+j/k+i*b
   (e) a=c+j%2+b
   (f) a= (b+1)%(c+1)
3. Write a program for the interest charged in installments for following case. A cassette player costs Rs. 2000. A shopkeeper sells it for Rs. 100 down payment andRs. 100 for 21 more months. What is the monthly interest Charged?
4. Write a program that uses a "for" loop to compute and prints the sum of a given numbers of squares.
5. Write a program to obtain the product of the following matrices and explain it;

$$A = \begin{bmatrix} 3 & 5 & 7 \\ 2 & -3 & 4 \\ 4 & 5 & 2 \end{bmatrix}$$

6. Write a function to add, subtract, multiply and divide two complex numbers(x+iy) and (c+id).
7. Write a program which will read a line and delete from it all occurrences of the word "that".
8. What is a pointer and explain its applications? Write a program that uses pointers to copy an array of double.

   OR

   Define a pointer. Write a function that is passed an array of n pointers to the maximum of the n floats.
9. Define a structure of employee having data members name, address, age, and salary. Take data for n employee in an array dynamically and find the average salary.
10. Given a text file, create another text file deleting the following words "three", "bad", and "time".

    OR

    Why do you require graphical function? Explain the basic graphical function with suitable program.

Year: 2066

Attempt all questions. All question carry equal marks.

1. Why flow chart is required? Explain different symbols used in the flow chart and explain with suitable example.
2. Determine which of the following are valid identifiers? If invalid, explain why?
   (a) record1
   (c) file_3
   (e) #tax

(g) goto
(i) name-and-address
(k) void

3. Fine the error in the given program and explain it. Write the correct program.

```
#include<stdio.h>
Include<math.h>
main
{
Float p,r,n;
printf("Please enter a value for the principal(P):");
scanf(%f,&p):
printf("Please enter a value for the interest rate(R));
scanf("%f",&r);
printf("Please enter a value for the number of years(n):");
scanf("%f,n);
f = p *pow +r/100),n);
printf(\n The final value(F) is: %.2f\n",f);
```

4. Write a program that uses a "while" loop to compute and prints the sum of a given numbers of squares.For example, if 4 is input, then the program will print 30, which is equal to $1^2+2^2+3^2+4^2$.
5. Write a program to enter two 3x3 matrices and calculate the product of given matrices.
6. Explain the use of two dimensional arrays. Illustrate it with suitable program and explain it.
7. Write and test the following power () function that returns x raised to the power n, where n can be any integer:
   double power(double x, int p)
8. Justify that pointer is jewel of C language. Write a function that is passed an array of n pointers to floats and returns a newly created array that contains those n float values in reverse order, Assume any necessary data.

   OR

   Explain pointer with suitable diagram; Write a function that uses pointers to search for the address of a given integer in a given array. If the given integer is found, the function returns its address; otherwise it returns NULL.
9. Why structure is required? Make a program using structure of booklist having data member's title, author, and cost. Enter four data and calculate total cost.
10. Create a text file and enter "to write a good program is very time consuming job."Create another text which contains reverse of above text.

    OR

    Explain the use of graphical function. Make a program that contains basic graphic functions.

Year: 2067

Attempt all questions. All question carry equal marks.

1. Draw the flow chart for the solution of a quadratic equation and write an algorithm and explain it.
2. Find the value of "a" in each of the following statements.

```
int i=2 , j=5, k=7;
Float a =1.5, b = 2.5, c = 3.5;
```

   (a) a = c–i/j+ c/k
   (b) a = (c-i)/k + (j+b)/k

(c) a=b*b-((ai+j/c);
(d) a=b–k+j/k+i*c
(e) a=c+k%2+b
(f) a=(b+4)%(c+2)

3. A machine is purchased which will produce earning of Rs. 20000 per year while it lasts. The machine costs Rs. 120000 and will have a salvage value of Rs. 20000 when it is condemned. If the 12 percent per annum can be earned on alternative investmenst what should be the minimum life of the machine to make it a more attractive investment compared to alternative investements?
4. Write a program to transpose the following matrix.

$$A = \begin{bmatrix} -3 & 7 & 5 & -2 & 8 \\ 2 & 5 & 8 & 3 & -4 \\ -6 & 9 & 3 & 6 & 5 \end{bmatrix}$$

5. Write a program that uses a do…while loop to compute and prints the sum of squares given n numbers.
6. Write a function to multiply two nxn matrices.
7. Write a program to count the number of words in a sentence.
8. Why pointer is called jewel of C language? Write a program that uses pointers to copy an array of integer.

OR

Explain the importance of pointer. Write a function that is passed an array of n pointers to floats and returns a newly created array that contains those n float values.

9. Define a structure of student having data member's name, address, marks in C language, and marks in information system. Take data for n students in an array dynamically and find the total marks obtained.
10. Some text file is given; create another text file replacing the following words "Ram" to "Hari", "Sita" to "Gita", and "Govinda" to "Shiva".

OR

What are the uses of graphical function? Explain the basic graphical function with suitable program.

Year: 2068

Attempt all questions. All question carry equal marks.

1. Write an algorithm and flow chart to determine whether a given integer is odd or even and explain it.
2. How can you declare the variable in C? Explain with example.
3. Write a program to find the factorial of a given integer.
4. Explain switch statement with example.
5. Write a program to find the largest and smallest among the given elements in an array.
6. Explain the user-defined functions and its types with example.
7. Write a program to accept two numbers and sort them with using pointer.
8. Explain the passing structure to function with example.
9. Write a program to accept any number and print the sum of that number up to a single digit through recursive function.
10. Explain the pointer to structure with example.

OR

Write short notes on:

a) Dynamic memory allocation b) Opening and Closing file

First Year/ First Semester

Subject : Calculus and Analytical Geometry **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Attempt all questions.

Group A **(10 x 2 = 20)**

1. Verify Rolle's theorem for the function f(x) = $\frac{x^3}{3}$ - 3x on the interval [-3,3].
2. Obtain the area between two curves y = $\sec^2 x$ and y = sinx from x =0 to x = $\pi/4$.
3. Test the convergence of p-series $\sum_{n=1}^{\infty} \frac{1}{np}$ for p>1.
4. Find the eccentricity of the hyperbola $9x^2-16y^2 =144$
5. Find a vector perpendicular to the plane of p(1,-1,0), Q(2,1,-1) and R(-1,1,2).
6. Find the area enclosed by the curve $r^2 = 4\cos 2\theta$
7. Obtain the values of $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ at the point(4,-5) if $f(x,y) =x^2 +3xy + y -1$
8. Using partial derivatives , find $\frac{dy}{dx}$ if $x^2+\cos y – y^2 =0$
9. Find the partial differential equation of the function $(x-a)^2 +(y-b)^2 + z^2 =c^2$
10. Solve the partial differential equation $x^2p + q = z^2$.

Group B **(5 x 4 = 20)**

11. State and prove the mean value theorem for a differentiable function
12. Find the length of the Astroid $x = \cos^3 t$, $y = \sin^3 t$ for $0 \leq t \geq 2t$
13. Define a curvature of a curve. Prove that the curvature of a circle of radius is a
14. What is meant by direction derivative in the plane? Obtain the derivative of the function f(x,y) = x2+xy at P(1,2) in the direction of the unit vector $v=\left(\frac{1}{\sqrt{2}}\right)i +\left(\frac{1}{\sqrt{2}}\right)j$
15. Find the centre of mass of a solid of constant density δ , bounded below by the disk:
    $X^2+y^2 = 4$ in the plane z =0 and above by the paraboid $z = 4-x^2-y^2$.

Group C **(5 x 8 = 40)**

16. Graph the function f(x) = -x3+12x+5 for $-3 \leq x \leq 3$.
17. Define Taylor's Polynomial of order n. Obtain Taylor's Polynomial and Taylor's Series generated by the function f(x) =e^x at x =0.
18. Obtain the centroid of the region in the first quadrant that is bounded above by the line y =x and below by the parabola $y =x^2$.
19. Find the maximum and the minimum values of $f(x,y) = 2xy-2y^2 -5x^2+4x+4y-4$.Also find the saddle point if it exist.

OR.

Evaluate the integral $\int_0^{\sqrt{2}} \int_0^{3y} \int_{x^2+3y^2}^{8-x^2-y^2} dzdxdy$

20. What do you mean by D'Alembert's solution of the one-dimensional wave equation? Derive it.

OR

Find the particular integral of the equation $(D^2-D^1)z=2y-x^2$. Where $D = \frac{\partial}{\partial x}$, $D' = \frac{\partial}{\partial y}$

Year: 2066

Attempt all questions.

Group A **(10 x 2 = 20)**

1. Find the length of the curve $y = x^{3/2}$ from x =0 to x =4
2. Find the critical points of the function $f(x) = x^{3/2}(x-4)$
3. Does the following series converge?

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots$$

4. Find the polar equation of the circle $(x+2)^2+y^2 =4$.
5. Find the area of the parallelogram where vertices are A(0,0), B(7,3),C(9,8)and D(2,5)
6. Evaluate the integral

$$\int_t^{2t} \int_0^t (sinx + cosx)\, dx\, dy$$

7. Evaluate the limit

$$\lim_{(x,y)\to(0,0)} \frac{x2 - xy}{\sqrt{x} - \sqrt{y}}$$

8. Find $(\frac{\partial \omega}{\partial x})_{y,z}$ if $\omega = x2 + y - z + sintandx + y = t$
9. Solve the partial differential equation p+q =x
10. Find the general integral of the linear partial differential equation $z(xp-yq)=y^2-x^2$

Group B **(5 x 4 = 20)**

11. State and prove Rolle's Theorem.
12. Find the length of the cardioid $r = 1+\cos\Theta$
13. Define unit tangent vector of a differentiable curve. Fine the unit tangent vector of the curve r(t)= (cos t +t sin t)I +(sin t – tcost) t>0
14. What do you mean by critical point of a function f(x,y) in a region? Find local extreme values of the function $f(x,y) = xy - x^2-y^2-2x-2y+4$
15. Find a particular integral of the equation:

$$\frac{\partial 2y}{\partial x2} - \frac{\partial z}{\partial y} = 2y-x^2$$

Group C **(5 x 8 = 40)**

16. Graph the function $y = x^{4/3} - 4x^{1/3}$
17. What do you mean by Taylor's Polynomial of order n? Obtain Taylor's polynomial and Taylor's series generated by the function f(x) = cos x at x =0.
18. Find the volume of the region D enclosed by the surfaces $z = x^2 +3y^2$ and $z=8-x^2-y^2$

19. Obtain the absolute maximum and minimum values of the function f(x,y) = 2 +2x +2y $-x^2-y^2$ on the triangular plate in ht first quadrant bounded by lines x =0, y=0, y =9-x

OR

Evaluate the integral

$$\int_0^1 \int_0^{3-3x} \int_0^{3-3x-y} dzdydx$$

20. Show that the solution of the wave equation

OR

Find a particular integral of the equation$(D^2-d^1)z$ = Acos(lx+my) where A,l,m are constants

Year: 2067

Attempt all questions.

Group A **(10 x 2 = 20)**

1. Define a relation and a function from a set into another set. Give suitable examples.
2. Show that the series$\sum_{n=1}^{\infty} \frac{1}{n^2}$ converses by using integral test.
3. Investigate the convergence of the series $\sum_{n=0}^{\infty} \frac{2^n+5}{3^n}$
4. Find the foci, vertices, center of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$
5. Find the equation for the plane through (-3, 0, 7) perpendicular to $\vec{n}=5\vec{i}+2\vec{j}-\vec{k}$.
6. Define cylindrical coordinates(r, Θ, z).Find an equation for the circular cylinder $4x^2+4y^2=9$ in cylindrical coordinates.
7. Calculate $\int\int f(x,y)\,da$for
   f(x,y) = $1-6x^2y$, R:0≤x≤2, -1≤y≤1.
8. Define Jacobian determinant for
   X=g(u,v,w), y = h(u,v,w), z=k(u,v,w).
9. What do you mean by local extreme points of f(x, y)? Illustrate the concept by graphs.
10. Define partial differential equations of the first index with suitable examples.

Group B **(5 x 4 = 20)**

11. State the mean value theorem for a differentiable function and verify it for the function f(x) = $\sqrt{1-x^2}$ on the interval [-1,1].
12. Find the Taylor series and Taylor polynomials generated by the function f(x) = cosx at x=0.
13. Find the length of the cardioid r = 1-cosΘ.
14. Define the partial derivative of f(x,y) at a point (x0,y0) with respect to all variables. Find the derivative of f(x,y) = xe^y+ cos(x,y) at the point(2,0) in the direction of A = 3i-4j.
15. Find the general solution of the differential equation:
    $x^2\frac{\partial z}{\partial x} + y^2\frac{\partial z}{\partial x} = (x+y)z$.

Group C **(5 x 8 = 40)**

16. Find the area of the region in the first quadrant that is bounded above by $y = \sqrt{x}$ and below by the x-axis and the line y = x-2.

OR

Investigate the convergence of the integrals.

(a) $\int_0^1 \frac{1}{1-x} dx$

(b) (b) $\int_0^3 \frac{dx}{(x-1)^{2/3}}$

17. Calculate the curvature and torsion for the helix,
r(t) =(a cos t)I +(a sin t)j + btk, a,b≥0, $a^2+b^2 \neq 0$
18. Find the volume of the region D enclosed by the surfaces $z = x^2+3y^2$ and $z = 8-x^2-y^2$.
19. Find the absolute maximum and minimum values of $f(x,y) = 2 +2x+2y-x^2-y^2$ on the triangular plate in the first quadrant bounded by lines x =0, y=0 and x+y =9.

OR

Find the points on the curve $xy^2 = 54$ nearest to the origin. How are the Lagrange multipliers defined?

20. Derive D' Alembert's solution satisfying the initials conditions of the one-dimensional wave equation.

Year: 2067

Attempt all questions.

Group A **(10 x 2 = 20)**

1. Define one-to-one and onto functions with suitable examples.
2. Show by integral test that the series $\sum_{n=1}^{\infty} \frac{1}{x^p}$, converges if p>1.
3. Test the convergence of the series
$$\sum_{n=1}^{\infty} (-1)^{x+1} \frac{1}{x^2}$$
4. Find the focus and the directrix of the parabola $y^2 = 10x$.
5. Find the point where the line $X = \frac{8}{3} + 2t$, y = -2t, z = 1 +t intersects the plane 3x + 2y +6z = 6.
6. Find a spherical coordinate equation for the sphere $X^2 + y^2 + (z-1)^2 = 1$.
7. Find the area of the region R bounded by y = x and $y = x^2$ in the first quadrant by using double integrals.
8. Define Jacobian determinant for X = g(u, v, w), y =h(u, v, w), z = k(u, v, w).
9. Find the extreme values of $f(x, y) = x^2+ y^2$.
10. Define partial differential equations of the second order with suitable examples.

Group B **(5 x 4 = 20)**

11. State Rolle's Theorem for a differential function. Support with examples that the hypothesis of theorem are essential to hold the theorem.
12. Test if the following series converges
(a) $\sum_{n=1}^{\infty} \frac{x^2}{2^x}$
(b) $\sum_{n=1}^{\infty} \frac{2^x}{x^2}$

13. Obtain the polar equations for circles through the origin centered on the x – and y – axis and radius a.

14. Show that the function $f(x) = \begin{cases} \frac{2xy}{x^2+y^2}, (x,y) \neq (0,0) \\ 0, \quad (x,y) = 0 \end{cases}$ is continuous at every point except the origin.

15. Find the solution of the equation $\frac{\partial 2y}{\partial x2} - \frac{\partial 2z}{\partial y2}$ =x –y.

Group C **(5 x 8 = 40)**

16. Find the area of the region enclosed by the parabola $y = 2 - x^2$ and the line y =-x.

OR

Evaluate the integrals

(a) $\int_0^3 \frac{dx}{(x-1)^{2/3}}$

(b) $\int_{-\infty}^{\infty} \frac{dx}{1+x^2}$

17. Define a curvature of a space curve. Find the curvature for the helix r (t) = (a cost)I + (a sint) j + btk(a, b $\geq$0, $a^2 + b^2 \neq 0$).

18. Find the volume of the region D enclosed by the surfaces $z = x^2 + 3y^2$ and $z = 8-x^2 - y^2$.

19. Find the maximum and minimum values of the function $f(x,y)$ = 3x + 4y on the circle $x^2 + y^2 = 1$.

OR

State the conditions of second derivative test for local extreme values. Find the local extreme values of the function $f(x,y)$ = x^2+ xy + y^2 + 3x – 3y + 4.

20. Define one- dimensional wave equation and one-dimensional heat equations with initial conditions. Derive solution of any one of them.

First Year/ First Semester

Subject : Probability and Statistics **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Group A

Attempt Any Two: (2 x 10 = 20)

1. Show that the mean and variance of Poisson distribution are equal. Telephone calls enter a college switchboard on the average of two every 3 minutes. If one assumes an approximate Poisson Process What is the probability of three or more calls arriving in a 9- minute period?
2. Differentiate between confidence level and level of significance.A manufacturer of flashlight batteries took a sample of 10 batteries from a day's production and used them continuously until they failed to work. The life as measured by the number of hours until failure was:
   34 42 31 54 26 45 63 51 26 56
   At the 0.05 level of significance, is there evidence that the mean life of the batteries is different from 10 hours?
3. A chemical company, wishing to study the effect of extraction time on the efficiency of an extraction operation, obtained the data shown in the following table:

Extraction Time in minute(X)	27	45	41	19	35	39	19
Extraction efficiency in %(Y)	57	64	80	46	62	72	52

   (a) Fit a straight line to the given data by the method of least squares and use it to predict the extraction efficiency one can expect when the extraction time is 35 minutes.
   (b) Determine the coefficient of determination and interpret its meaning.

Group B

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

4. The following are the numbers of minutes that a person had to wait for the bus to work on 15 working days: 10,1,13,9,5,9,2,10,3,8,6,17,2,10 and 15. Find mean, median, mode and describe the shape of the distribution.
5. The probability that an integrated circuit chip will have defective etching is 0.12 , the probability that it will have a crack defect is 0.29, and the probability that it has both defects is 0.07. What is the probability that a newly manufactured chip will have either an etching or a crack defects.
6. An importer is offered a shipment of machine tools for Rs. 140,000 and the probabilities that he will be able to sell them for Rs. 180,000 Rs, 170,000 or Rs.150,000 are 0.32, 0.55 and 0.13 respectively. What is the importers expected gross profit?
7. If Two random variables have the joint density
   $f(x,y) = \frac{6}{5}(x + y^2)$ for $0<x<1$, $0<y<1$
   0 elsewhere
   Find the probability that $0.2<X<0.5$ and $0.4<Y<0.6$

8. It is believed that 80% of Nepalese do not have any health insurance. Suppose this is true and let X equal the number with no health insurance in a random sample of n = 12 Nepalese.
   i) Write the probability model of X?
   ii) Give the mean and variance of X.
   iii) Find P(X>2).
9. Given a random variable having the normal distribution with μ and σ^2= 1.5625, find the probabilities that it will take on a value (i) greater than 16.8, (ii) less than 14.9 (iii) between 13.6 and 18.8.
10. Define canonical definition of Chi square distribution and write its density function and its some properties.
11. Obtain the maximum likelihood estimate for the parameter π(proportion of success) of binomial distribution.
12. The average zinc concentration recovered from a sample of zinc measurements in 36 different locations is found to be 2.6 grams per milliliter. Find the 95% confidence interval for the mean zinc concentration. Assume that the population standard deviation is 0.3
13. Explain the purpose of regression analysis. State model and assumptions of simple linear regression.

Year: 2066

Group A

Attempt Any Two: (2 x 10 = 20)

1. Define the following three measures of locations – mean, median and mode – and clearly state their properties. Write down a situation where mode is preferred to mean. Score obtained by 14 Students in a test are given below. Compute mean, median and mode.

42	39	45	55	38	35	60	55	55	65	40	43	35	37

2. Explain the terms – sample Space and events of a random experiment. State the classical and the statistical definition of probability. Which of the two definitions is most useful in statistics and why? A survey of 300 families was conducted to study income level versus brand preference. The data are summarized below.

	Brand			
Income Level	Brand 1	Brand 2	Brand 3	Total
High	55	45	20	120
Medium	45	25	25	95
Low	25	35	25	85
Total	125	105	70	300

If a family is selected at random, then compute the probability that (a) the family belongs to high income group, (b) the family prefers Brand 3, and (c) the family belongs to the low income group and prefers Brand 3.

3. Make a clear distinction between correlation coefficient and slope regression coefficient, A school teacher believes that there is a linear relationship between the verbal test score(Y) for eighth graders and the number of library books checked out(X). Following are the data collected on 10 students.

X	12	15	3	7	10	5	22	9	13	7
Y	77	85	48	59	75	41	94	65	79	70

The above data reveal the following statistics:
$\sum X=103$, $\sum Y = 693$, $\sum X^2 =1335$, $\sum Y^2=50447$, $\sum XY =7881$

(a) Compute the correlation coefficient r between X and Y. Interpret the meaning of r^2.

(b) Fit a simple linear regression model of Y on X using the least square method. Interpret the estimated slope regression coefficient.

Group B

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

4. State with suitable examples the role played by computer technology in applied statistics and also the role of statistics in Information technology.
5. Define discrete and continuous random variables with suitable examples. A continuous random variable X has the following density function.

$$f(x) = \begin{cases} kx(1-x) & for\ 0 < x < 1 \\ 0 & elsewhere \end{cases}$$

Find the value of k so that the total probability would be 1. Also find E(X).

6. Assume that the two continuous random variables X and Y have the following density function

$$f(x) = \begin{cases} \frac{6-x-y}{8} for\ 0 < x < 2, 2 < y < 4 \\ 0 \quad elsewhere \end{cases}$$

7. In a binomial distribution with parameters n and p, prove that mean and variance in binomial distribution are correspondingly np and npq, where q = 1-p
8. The systolic blood pressure of 18 years old women(X) is normally distributed with a mean of 120 mm Hg and a standard deviation of 12 mm Hg randomly selected 18 years old women. Compute the following probabilities:
   (a) P(X>150), (b) P(X<115) (c) P(110<X<130)
9. If $X_1, \ldots, X_n$ are n independent random variables each is distributed as normal with mean μ and variance σ^2, then derive the distribution of $\sum_{i=1}^{n} x_i$.
10. Write the density function of negative exponential distribution, and derive its mean and variance.
11. Obtain the maximum likelihood function of n independent random sample drawn from the normal population with unknown mean μ and unknown variance σ^2 and, using the principle of maximum likelihood method of estimation derive the estimators of μ and σ^2.
12. A survey of 100 percents of first and second grade children revealed that the number of hours per week their children watch television (X) had an average of 25.8 hours and standard deviation of 4.0 hours. The problem is to determine whether there is statistical evidence to conclude that μ(population mean of X) exceeds 25 hours. Set up appropriate null and alternative hypothesis and carry out appropriate test at 5% level of significance.
13. A standardized psychology exam has a mean of 70. A research psychologist wished to see whether a particular drug had an effect on performance on the exam. He administered exam to 18 volunteers who had taken the drug, and obtained the following scores :68,71,71,65,64,70,70,64,71,73,62,78,70,69,76,67,69,72 which yielded $\bar{x}$ = 69.4444 and s^2 = 16.8497 . The problem is to determine whether there is statistical evidence suggesting that taking drug reduces one's score on the exam. Set up appropriate null and alternative hypothesis and carry out the test at 5% level.

Year: 2067

Group A

Attempt Any Two: (2 x 10 = 20)

1. State Baye's Theorem. In a certain assembly plant, three machines B_1,B_2 and B_3 make 30%,45%and 25% respectively, of the product. It is known from past experience that 2%, 3% and 2% of the products made by each machine, respectively, are defective. If a product were chosen randomly and found to be defective, what is the probability that it was made by machine B_3.

2 (a) Explain point estimation and interval estimation. What are the criteria of good estimators?

(b) If $\bar{X}$ =50 , s = 15 , n =16 and assuming that the population is normally distributed, estimate the standard error of the sample mean and estimate 99% confidence interval for the population mean μ.

3 (a) Define Karl Pearson's correlation coefficient and state its properties.

(b) The following table shows the production of coal and the number of wage earners in the coal industry over a ten year period during which the capital equipment has remained constant.

Output in tons(y)	21	21	20	18	17	17	14	13
No of workers(X)	70	68	65	50	47	47	44	43

Determine the fitted regression line and predict Y for X = 55.

Group B

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

4. The following data represent the total fat for burgers from a sample of fast-food chains.
   19 31 34 35 39 43
   Compute mean, median and mode then describe the shape of the distribution.
5. What is axiomatic definition of probabilities and what are its properties?
6. If two random variables X1 and X2 have the joint probability density
   $f(x1,x2) = \frac{2}{3}(x_1 + 2x_2)$ for $0<x_1<1$, $0<x_2<1$
   0, elsewhere
   Find the conditional density of X_1 given $X_2 = x_2$.
7. Prove that Var(X+Y) = Var(X)+Var(Y) +2Cov(X,Y).
8. Find the first and second moments of binomial distribution and also compute variance for the binomial distribution.
9. Service calls come to a maintenance center according to a Poisson process and on the average 2.7 calls come per minute. Find the probability that no more than 4 calls come in any period.
10. In a photographic process, the developing time of prints may be looked upon as a random variable having the normal distribution with a mean of 16.28 seconds and a standard deviation of 0.12 second. Find the probability that it will take (i) anywhere from 16.00 to 16.50 seconds to develop one of the prints, (ii) at least 16.20 seconds to develop one of the prints.
11. Obtain the maximum likelihood estimate for mean (μ) and variance (σ^2) of the normal distribution.
12. Define canonical definition of t-distribution. Discuss some of its properties.
13. It is claimed that an automobile is driven on the average more than 20,000 kilometers per year. To test this claim, a random sample of 100 automobiles owners

are asked to keep a record of the kilometers they travel. Would you agree with this claim if the random sample showed an average of 23,500 kilometers with a standard deviation of 3900 kilometers?

Year: 2068

Group A

Attempt Any Two: (2 x 10 = 20)

1. Define the following three measures of dispersion – range, standard deviation and inter quartile range –by clearly state their properties. Write down a situation where range is preferred to Standard deviation. Score obtained by 10 Students in a test are given below. Compute range, and standard deviation.

42	55	35	60	55	55	65	40	45	35

2. There are three traffic lights on your way home. As you arrive at each light assume that it is either red (R) or green (G) and that it is green with probability 0.7 . Construct the sample space by listing all possible eight simple events. Assign probability to each simple event. Are the events equally likely? What is the probability that you stop no more than one time.
3. A large company wants to measure the effectiveness of radio advertising media (X) on the sale promotion (Y) of its products. A sample of 22 cities with approximately equal population is selected for study. The sales of the product in thousand Rs and the level of radio advertising expenditure in thousand Rs are recorded for each of the 22 cities (n) and sum, sum of square, and sum of cross product of X and Y are summarized below.

   $\sum Y = 26953m$ $\sum X = 950$, $\sum Y^2 = 35528893$, $\sum X^2 = 49250$, & $\sum XY = 1263940$

   (a) Fit a simple linear regression model of Y on X using the least square method. Interpret the estimated slope coefficient.

   (b) Compute R^2 and interpret it.

Group B

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

4. Describe the scopes and limitations of statistics in empirical research.
5. Write down the properties and importance of density function of a continuous random variable. Suppose a continuous random variable X has the density function.

   $$f(x) = \begin{cases} k(1-x)^2 for\ 0 < x < 1 \\ 0 \ \ elsewhere \end{cases}$$

   Find (a) value of the constant k, and (b) E(X).
6. Suppose that X and Y have joint density function

   $$f(x) = \begin{cases} (x+y), & if\ 0 < x, \quad y < 1 \\ 0 & otherwise \end{cases}$$

   Find

   (a) Marginal density function of X and Y, and

   (b) Covariance between X and Y.
7. In a Poisson distribution with parameter λ derive the mean and variance of the distribution.
8. The length of life of automatic washer (X) is approximately normally distributed with mean and standard deviation equal to 3.1 and 1.2 years, respectively. Compute the probabilities (a) P(X>1), (b) P(X>2.5) and (c) P(1<X<2).

9. If $X_1, X_2, \ldots, X_n$ are n independent random variables each is distributed as normal with mean μ and variance σ2 , then derive the distribution of $\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$

10. If a continuous random variable X has exponential distribution with density function

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & for\ x > 0 \\ 0 & otherwise \end{cases}$$

For h>0 , prove that P(X>t + h | X > t) = P(X>h), and hence prove that P(X>t + h) = P(X >t) x P(X>h).

11. If $X_1, X_2, \ldots, X_n$ are n independent Bernoulli random variables with common mean p, derive the maximum likelihood estimator of p. Prove or disprove the estimator is unbiased for p ?

12. A car manufacturer claims that its car use, on average, no more than 5.5 gallons of petrol for each 100 miles. A consumer groups tests 40 of the cars and finds an average consumption of 5.65 gallons per 100 miles and a standard deviation of 1.52 gallons. Do these results cast doubt on the claim made by the manufacturer ? Answer the question by setting appropriate null and alternative hypotheses and testing the null hypothesis at 5% level of significance.

13. The average length of time required to complete a certain aptitude test is claimed to be no more than 80 minutes. A sample of 25 students yielded an average of 86.5 minutes and a standard deviation of 15.4 minutes. Do these results cast doubt on the claim? Assuming that test score is normally distributed answer the query by setting appropriate null and alternative hypotheses and testing the null hypothesis at 5 % level of significance.

First Year/ First Semester

Subject : Statistics 1 **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Group A

Attempt any Two (10 x 2 = 20)

1. Differentiate simple random sampling and stratified random sampling. Show that
   (i) In simple random sampling without replacement (SRSWOR), the sample mean is an unbiased estimate of the population mean.
   (ii) In SRSWOR, the variance of the sample mean is given by
   $var(\bar{y}_n) = \frac{S^2}{n}.\frac{N-n}{N}$
2. Test the hypothesis of no difference between the ages of male and female employees of a certain company using the Mann-Whitney U test for the sample data. Use the 0.10 level of significance.

Males	31	25	38	33	42	40	44	26
Females	44	30	34	47	35	32	35	47

3. Suppose you are given following information with n = 28.
   Multiple regression model $Y = 5+18X_1+20X_2$
   Sample size (n) = 28
   Total sum of squares (TSS) =250
   Sum of squares due to error (SSE) =100
   Standard error of regression coefficient of X1(Sb_1) = 3.2
   Standard error of regression coefficient of X2(Sb_2) = 5.5
   i. Predict the value of Y for $X_1 = 15$ and $X_2 = 25$.
   ii. Test the significance of regression coefficient of X_2.
   iii. Compute the Coefficient of multiple coefficient of determination.

Group B

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

4. Show that in two stage sampling with srswor at both stages. $\bar{y}$ is an unbiased estimator of $\bar{Y}$.
5. What do you mean by partial correlation coefficient? State the relationship between simple and partial correlation coefficients when there are three variables. If r_{12} =0.5, r_{23} = 0.1 and r_{13}=0.4, compute r_{123} and r_{231}.
6. Define cluster sampling with sample mean and variance of sample mean.
7. For what conditions non parametric test is used. Explain some important non parametric test.
8. The weights of 4 people before they stopped smoking, in kilogram, are as follows:

Before	66	80	69	52	75
After	71	82	68	56	73

   Use the signed-rank test for paired observations to test the hypothesis, at 0.05 level of significance, that giving up smoking has no effect on a person's weight against the alternative that one's weight increases if he or she quits smoking.
9. A random sample of 15 adults living in a small town is selected to estimate the proportion of voting favoring a certain candidate for mayor.Each individual was also asked if he or she was a college graduate. By letting Y and N designate the

responses of "yes" and "no" to the education question, the following sequence was obtained:

N	N	N	N	Y	Y	N	Y	Y	N	Y	N
N	N	N									

Use the runs test at the 0.05 level of significance to determine if the sequence supports the contention that the sample was selected at random.

10. In an experiment to study the dependence of hypertension on smoking habits, the following data were taken on 180 individuals:

	Non Smokers	Moderate Smokers	Heavy Smokers
Hypertension	21	36	36
No hypertension	48	26	19

Test the hypothesis that the presence or absence of hypertension is independent of smoking habits. Use a 0.05 level of significance.

11. Define dummy variable. What condition should be necessary for fitting logistic regression?
12. Suppose the residuals for a set of data collected over 9 consecutive time periods are as follows:

Time Period:	1	2	3	4	5	6	7	8	9
Residuals:	-2	-3	2	-1	0	1	4	-2	1

Compute the Durbin Watson statistics. At the 0.05 level of significance, is there evidence of autocorrelation among the residuals?

13. Describe multiple regression models with its assumption. Also describe the method of obtaining its parameters.

Year: 2066

Group A

Attempt any Two (10 x 2 = 20)

1. Describe Simple random sampling with and without replacement for drawing a random sample of size n from a population of size N. In both cases show that sample mean is unbiased estimate of the population mean. Derive the variance of the sample mean in both cases. Show that the ration of the variance of sample mean in sampling without replacement to that sampling with replacement is $\frac{N-n}{N-1}$.

   Comment on this result

2. Describe the function and the procedure of the Kruskal-Wallis one-way ANOVA test by ranks. The original data of three independent samples were collectively converted to ranks as shown in the adjacent table. Set up appropriate null and alternative hypotheses and carry out the Kruskal_Wallis test at 5% level.

Sample 1	Sample 2	Sample 3
1	2	5
4	3	9
6	7	12
10	8	18
11	13	20
14	15	22
16	17	23
19	21	24

3. In order to establish the functional relationship between annual salaries(Y), years of educated past high school,(X_1), and years of experience with the firm(X_2), data on these three variables were collected from a random sample of 10 persons working in a large firm. Analysis of data produces the following results.

   (a) The total Sum of squares, $\sum(Y_i - \bar{Y})^2$, is 397.6 and sum of squares due to error $\sum(Y_i - \hat{Y}_i)^2$, is 23.5. Compute the value of R^2 and interpret the result. Also compute the value of F statistic for testing the significance of the model. Interpret the model and carry out the test or significance of the two slope regression coefficients at 5% level by stating the null and alternative hypothesis explicitly.

   $\hat{Y}$ = -8.883 + 1.85X_1 + 2.92x_2

   (4.94) (0.59) (0.61)

Group B

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

4. Show that sample variance in simple random sampling method is an unbiased estimator of population Variance.
5. Write the sample multiple linear regression model of Y on X1, X2 and X3 based on a sample of size n. What are the assumptions to be made on this model for estimation and test of significance?
6. Test whether the color of sons' eyes is associated with that of the fathers at 5% level of significance using the data available in the following table.

	Sons' eye color		Row Total
Fathers' eye color	No light	Light	
Not light	230	148	378
Light	151	471	622
Column total	381	619	1000

7. Define the first order autocorrelation? Estimate the first order autocorrelation from the data available in the table below.

Time(t)	1	2	3	4	5	6	7	8	9	10	11
Residuals($\hat{u}_i$)	-5	-4	-3	-2	-1	0	1	2	3	4	5

8. In a Stratified sampling using simple random sampling without replacement method in each stratum, show that Var ($\bar{y}_{st}$) = $\sum\left(\frac{N_h}{N}\right)^2\left(1-\frac{n_h}{N_h}\right)\frac{S_h^2}{n_h}$.Simplify this expression when the total sample of size n is allocated according to proportional allocation across strata.
9. To evaluate a speed reading course, a group of 10 subjects was asked to read two comparable articles – one before the course and one after the course. Their scores on reading test are follows.

Before course(X)	57	80	64	7	90	59	76	98	70	83
After Course(Y)	60	90	62	7	95	58	80	99	75	94

   Test whether the course is beneficial using the Wilcoxon Signed Rank test at 5% level, of significance, given that $P(T^+>44|H_0) = 0.042$ where T^+ is the sum of the positive ranks of the difference $d_i=(y_i-x_i)$.
11. Describe the function and procedure of the median test.

12. Define the problem of multicollinearity in a multiple regression model. How do you detect it and correct it?
13. Write short notes on any two of the followings
    (a) Systematic Sampling
    (b) Order statistics
    (c) Heteroscedasticity

Year: 2067

Group A

Attempt any Two (10 x 2 = 20)

1. Describe in detail stratified random sampling method for drawing a random sample of size n from a population of size N. Write down the expression for an unbiased estimator $\bar{y}_{st}$ of population mean $\bar{Y}$ and derive an expression for Var$(\bar{y}_{st})$ when samples were drawn from each stratum by adopting simple random sampling without replacement method. Also find the Var $(\bar{y}_{st})$ under the scheme of proportional allocation of sample sizes to strata.
2. Write down the rationale and method of Wilcoxon matched-pairs signed rank test. Seven prospective graduate students took a test twice with the following scores.

First attempt	470	530	610	440	600	590	580
Second attempt	510	550	600	490	585	620	598

Compute the value of T^+ where T^+ is the sum of ranks of the positive differences(second attempt – first attempt) Using T^+ as test statistic carry out the test of the following hypothesis at level 0.05.

H_0: there is no statistical difference between the first and second attempt score

H_1: second attempt score tends to be larger than the first attempt score.

3. To study the effect of age(X_1 in years) and weight (X_2 in lbs) on systolic blood pressure (Y in mm Hg), the data were recorded for a sample of 15 adult males. The estimated regression model based on data is described below in the box where figures within parenthesis are standard error of the estimate. Further computation shows that

$\sum(Y_i - \bar{Y})^2$=1835.7 and $\sum(Y_i - \hat{Y}_i)^2$ = 1101.3

$\hat{Y}$=	27.4 +	0.22X1+	0.56X2
	(24.68)	(0.248)	(0.155)

(a) Explain the meanings of the estimated slope regression coefficients of the model.
(b) What value of Y would you predict if X1 = 55 and X2 = 175?
(c) Compute the value of R^2 and interpret it.
(d) Carry out the overall goodness-of-fit test of the model at 5% level of significance.
(e) Test the significance of slope regression coefficients at 5% level of significance.

Group B

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

4. Describe in detail systematic sampling method when N = k x n . Describe problems that will arise in systematic sampling method when N ≠ k x n.
5. If V_{srswr} and V_{srswor} correspondingly denote that variance of unbiased estimator of the population mean under simple random sampling with and without replacement method, then show that $(V_{srswr}-V_{srswor}) = \frac{n-1}{Nn}S^2$.
6. Compute the problem of determining if a die is fair or not. For this a die is rolled for 60 times and observed the following outcomes.

Side	1	2	3	4	5	6	Total
Number of times observed	8	9	13	7	15	8	60

Test the hypothesis H_0: the die is fair , that is, all sides have 1/6 chances of appearing against H_1 : the die is unfair at level 0.05.

7. Describe the method of Mann Whitney Test.
8. Suppose that an IQ test is given to eleven randomly selected pairs consisting of one brother and one sister from the same family. To test the null hypothesis that this sample was drawn from a population in which the median IQ of a brother and sister do not differ against the alternative hypothesis that the sister would score higher than brother. IQ

Sister's score	129	111	117	120	116	101	107	127	105	123	113
Brother's Score	115	108	123	104	110	98	106	119	95	130	101

Using sign test carry out the above said hypothesis at 5% level of significance.

9. Describe rationale and method of Kruskal-Wallis one-way ANOVA test.
10. Suppose in a multiple regression model problem, the ANOVA table is as follows. How many independent variables are in the model? What is the sample size? What is the value of R^2? Carry out the overall goodness-of-fit test of the model at 5% level of significance.

Source	SS	DF
Regression	36	2
Error	64	32

11. Explain the meaning of multicollinearity. How do you detect the problem of multicollinearity in multiple regressions?
12. Describe the Cobb-Douglas production function model with its application.
13. Define partial correlation coefficient. If r_{12} =0.33, r_{13}= 0.40, and r_{23} =0.76 then compute r_{132} and r_{231}

Year: 2068

Group A

Attempt any Two (10 x 2 = 20)

1. Write the importance of sampling over census. Describe systematic sampling. In a population with N = 6 the values of Y are 8, 3, 1, 11, 4 and 7. Calculate the sample Mean $\bar{y}$ for all possible simple random samples without replacement of size 2. Verify that $\bar{y}$is an unbiased estimate of $\bar{Y}$.

2. The following data represent the operating times in hours for three types of scientific pocket calculators before a recharge is required:

Calculator A	4.9	6.1	4.3	4.6	5.3	5.5
Calculator B	5.4	6.2	5.8	5.5	5.2	4.8
Calculator C	6.4	6.8	5.6	6.5	6.3	6.6

Use the Kruskal-Wallis test, at the 0.01 level of significance, to test the hypothesis that the operating times for all three calculators are equal.

3. The following table shows the scores(Y) made by ten assembly line employees on a test designed to measure job satisfaction. It also shows the scores made on an aptitude test (X_1) and the number of days absent(X_2) during the past year (excluding vacations).

Y	X_1	X_2
70	6	1
60	6	2
80	8	1
50	5	8
55	6	9
85	9	0
75	8	1
70	6	1
72	7	1
64	6	2

The summation values are as following:

$\sum Y = 681$, $\sum X1 = 67$ $\sum X2 = 26$ $\sum X_1Y = 467$ $\sum X_2Y = 1510$

$\sum X_1X_2 = 153$ $\sum Y^2 = 47455$ $\sum X_1^2 = 463$ $\sum X_2^2 = 158$

(i) Calculate the least squares equation that best describes these three variables.

(ii) Predict the value of scores when aptitude test is 7 and number of days absent is 6.

Group B

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

4. Show that in simple random sampling without replacement sample mean is unbiased estimate of population mean.
5. What do you mean by partial correlation coefficient? State the relationship between simple and partial correlation coefficient when there are three variables. If r_{12}= 0.5 , r_{23} = 0.1 and r_{13} = 0.4, compute $r_{12.3}$ and $r_{23.1}$
6. Explain two stage sampling with sample mean and corresponding variance.
7. Differentiate parametric and non parametric test.
8. In an industrial production line, items are inspected periodically for defectives. The following is a sequence (from left to right) of defective items, D, and non defective items, N, Produced by this production line:

D	D	N	N	N	D	N	N	D	D
N	N	N	N	N	D	D	D	N	N
D	N	N	N	N	D	N	D		

Use run test with a significance level 0.05 to determine whether the defectives are occurring at random or not.

9. Use the sign test to see whether there is a difference between the numbers of days required days required to collect an account receivable before and after a new collection policy. Use the 0.05 significance level.

Before	33	36	41	32	39	47	34	29	32

After	35	29	38	34	37	47	36	32	30

10. A random sample of 200 married men, all retired, was classified according to education and number of children.

Education	**Number of Children**		
	0-1	2-3	Over 3
Elementary	14	37	32
Secondary	19	42	17
College	12	17	10

Test the hypothesis, at the 0.05 level of significance, that the number of children is independent of the level of education attained by the father.

11. Write Cobb-Douglas production function with interpretation of the regression coefficients.
12. Suppose the residuals for a set of data collected over 8 consecutive time periods are as follows:

Time Period:	1	2	3	4	5	6	7	8
Residuals:	-4	-3	-3	-2	1	1	3	7

Compute the first order autocorrelation.

13. Explain the term multicollinearity and describe a situation where the problem of multicollinearity arises?

CSIT Questions Collections 2068

First Year/Second Semester

First Year/Second Semester

Subject : Digital Logic (CSc-151) **FM : 60**
Time : 3 hours **PM : 24**

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

Year: 2065

Long Answer Questions:

Attempt any two questions. (2x10=20)

1. Draw a block diagram, truth table and logical circuit of a 16 x 1 multiplexer and explain its working principle.
2. Explain the 4 bit ripple counter and also draw a timing diagram.
3. Design the full sub tractor circuit with using Decoder and explain the working rinciple.

Short Answer Questions:

Attempt any eight questions. (8x5=40)

4. Design a half adder logic circuit using only NOR gate.
5. Convert the following decimal numbers into hexadecimal and octal number.
   (a) 304 (b) 224
6. Describe the three variables K-map with example.
7. Design the Decoder using Universal gates.
8. What is combinational logic? What are its important features?
9. Describe the clocked RS flip-flop.
10. What do you mean by triggering of flip flop?
11. What are the shift Register operations?
12. Describe the Ripple counter.
13. Write short notes on:
    (a) Registers. (b) Digital. (c) EBCDIC.

Year: 2066

Long Answer Questions:

Attempt any two questions. (2x10=20)

1. Design the 4 bit Synchronous updown counter with timing diagram, logic diagram andtruth table.
2. Design a Full subtractor with truth table and logic gates.
3. Design a decimal adder with logical diagram and truth table.

Short Answer Questions:

Attempt any eight questions. (8x5=40)

4. Differentiate between Analog and Digital System.
5. Convert the following occ1 numbers to hexadecimal.
   a) 1760.46 b) 6055.263
6. Which gates can be used as inverters in additional to the NOT gate and how?
7. Draw a logic gates that implements the following
   a) A = (Y1 +Y2) (Y3 + Y4) + (Y5 + Y6+ Y7)

b) A=(X1OX2)+(X3 OX4)+(X4O X5)+(X6OX7)

8. State and prove DE Morgan's theorem 1 and 2 with logic; gates and truth table.
9. Reduce the following expressions using K-map.
   a) A +B(A+ B +D)(B +C)(B+C+D)
10. Differentiate between a MUX and a DEM1X.
11. Explain the operation of Decoder,
12. What are the various types of shift registers?
13. What do you mean by Synchronous counter?

Year: 2067

Long Answer Questions:

Attempt any two questions. (2x10=20)

1. What is magnitude comparator? Design logic circuits for 4 hit magnitude comparator and explain it.
2. What do you mean by full adder and full subtractor? Design a 3 to 8 line decoder using two 2 to 4 line decoder and explain it.
3. What is JK master slave flip-flop? Design its logic circuit, truthtab1e and explain the working principle.

Short Answer Questions:

Attempt any eight questions. (8x5=40)

4. Convert the following hexadecimal number to corresponding octal numbers.
   (a) 0FFF (n) 3FFF
5. Design a half adder logic circuit using NOR gates only,.
6. Proof the 1st and 2nd law of De Morgan's theorems with logic gate and truth table.
7. What do you mean by universal gate? Realize the following logic gates using NOR gates.

   OR

   (a) OR gate (b) AND gate.
8. Draw a logic circuit of 4X1 multiplexer.
9. What is a flip-flop? Mention the application of flip-flop.
10. Explain the ripple counter.

L1. Design the Decimal adder.

12. What do you mean by shift registers? Explain.
13. Write short notes on (any two):
    (a) Decoder (b) Integrated circuit (c) PLA

First Year/Second Semester

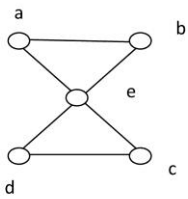
Subject : Discrete Structure (CSc-152) **FM : 60**
Time : 3 hours **PM : 24**

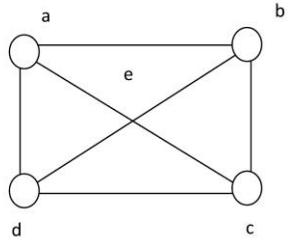
Year: 2065

Attempt all questions:

Group A

1. Given propositions p and q, define conjunction and disjunction of them.
2. Define existential quantifications with suitable example. ,
3. State which rule of inference is basis of the following argument: "It is below freezing and raining now, therefore, it is below freezing now".
4. State and prove the Pigeonhole principle.
5. Define linear homogeneous recurrence relation. .
6. Define the terms a language over a vocabulary and the phrase-structure grammar.
7. Distinguish between deterministic and nondeterministic finite state automaton.
8. Define the complete graph K_n on n vertices and the complete bipartite graph $K_{m,n}$ with suitable examples.
9. Which of the undirected graphs in the following figure have an Euler circuit? Explain.





10. What is the chromatic number of the complete bipartite graph $K_{m,n}$ where m and n are positive integers.

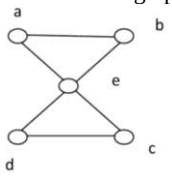
Group B

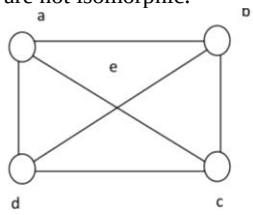
11. Explain the 4 rules of inference for quantified statements.
12. Find an explicit formula for the Fibonacci numbers, with recursion relation $f_{n-1}+ f_{n-2}$ and $f_0=0$, $f_1=1$.
13. Define finite-state with output with suitable examples.

OR

Define deterministic finite state automata. When are two finite state automata equivalent? Give an example.

14. Show that the graphs in the following figure are not isomorphic.





What can you say about the complexity of graph isomorphism algorithms in terms of complexity?

15. Prove that an undirected graph is a tree if and only if there is a unique simple path between any two of its vertices.

Group C **(5x8=40)**

16. Explain Tautologies, contradictions and contingencies with suitable examples.

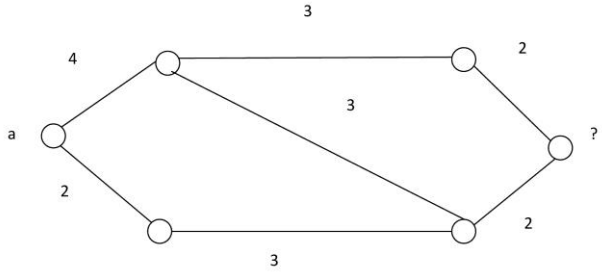
OR

Explain the method of proving theorems by direct, indirect, contradiction and by cases.

17. Define linear homogeneous recursion relation of degree K with constant coefficient with suitable examples. What is the solution of the recurrence relation $a_n = a_{n-1} + 2a_{n-2}$ with $a_0=2$ and $a_1 =7$?
18. Let G be the grammar with vocabulary V = {S, 0, 1}, set of terminals T = {0, 1), starting symbol S, and productions P {S ->11S, S->0}, what is L (G), the language of this grammar?
19. Explain the concept of network flows and max-flow win-cut theorem with suitable examples.
20. Define Eular and Hamiltonian circuits and paths with examples illustrating the existence and nonexistence of them.

OR

Discuss the shortest path algorithm of Dijkstra for finding the shortest path between two vertices. Use this algorithm to find the length of the shortest path between a and z in the following weighted graph?



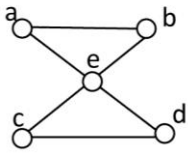
Give the idea of traveling salesman problem and the difficulties of solving it.

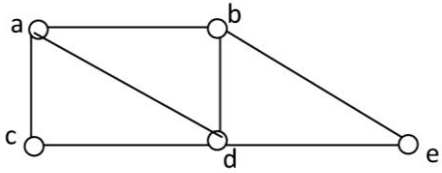
Year: 2065

Group A

1. Define proposition and its negation with an example.
2. Show that ¬(p v q) and ¬p^ ¬q are logically equivalent.
3. State which rule of inference is the basis of the following argument; "It is below freezing now. Therefore, it is either below freezing or raining now,"
4. State the Pigeonhole principle. How many students must be in a class to guarantee that at least two students receive the same score on the final exam is graded on a scale from O to 100?
5. Let$\{a_n\}$ be a sequence that satisfies the recursion relation$a_n = a_{n-1} - a_{n-2}$ for n ≥2 and suppose that $a_0 = 3$ and$a_1 = = 5$. Find the values$a_2$and a_3.
6. Let G be the grammer with vocabulary V {S, A, a, b}, t = {a, b), starting symbol S and productions P = { S →a.A. , S → b, A →aa}. What is L(G), the language of this grammer?
7. Detemine the kleene closures of the sets A = {0}, B = {0, 1), C {11}.
8. How many edges are there in a graph with ten vertices each of degree six?

9. Which of the undIrected graphs in the following have an Euler path?





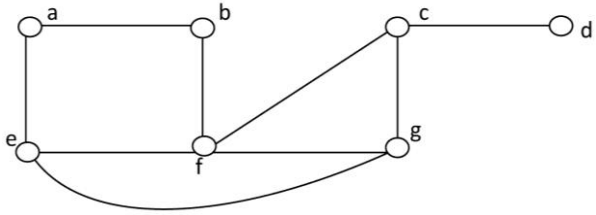
10. Determine the chromatic number K_n.
11. Differentate between existential and universal quantifiers with suitable examples.

12. Find the solution of the recursion relation
$a_n = a_{n-1} + 2a_{n-2}$ with $a_0 = 2$ and $a_1 = 7$?

OR

Find an explicit formula for the Fibonacci numbers.

13. Definedeterministic finite state automata. Construct a DFA whose language is the set of string that ends with 111 and contains odd number of one's.
14. Prove that an undirected graph is a tree if and only if there is a unique simple path between any two of its vertjces.
15. Find a spanning tree of the simple graph in the following graph, if it exists.



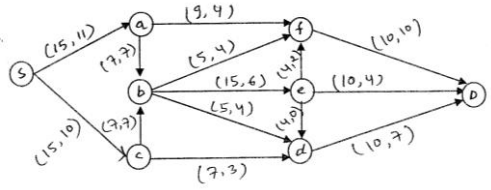
Can there be morepossibilties?

Group C **(5x840)**

16. Discuss the techniques of proofs by contradiction and by cases with suitable examples.
17. Describe linear homogeneous and linear nonhomogeneous recurrence relations with suitable examples.
18. Explain nondeterministic finite automate and language of NFA with suitable example.
19. State and prove the maxflow and Mincut theorem.

OR

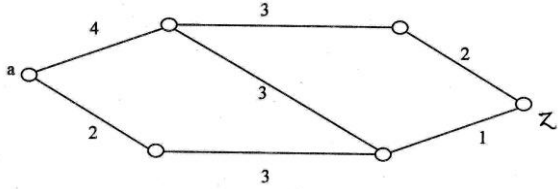
Find a maxjmum flow for the network jn the figure below.



20. Define Hamiltonian paths and circuits with suitable example for the existence and nonexistence.
Show that K_n has a HAmilton circuit whenever n≥3.

OR

Write the shortest path algorithm of Dijkistra for finiding the shortest path between two vertices .What is the length of shortest path between a and z in the weight ed graph in the following figure?

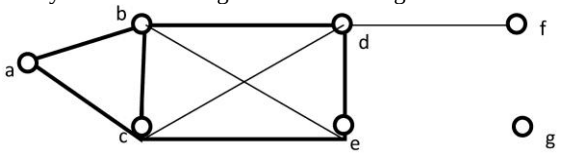


Apply the stated algorithm for finding the solution.

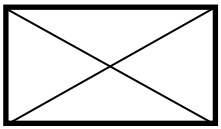
Year: 2067

Attempt all questions:

1. What do you mean by proposition, Give example to justify your answer?
2. How do you define logically equivalent propositions?
3. Give examples of addition rule and simplification rule of inference.
4. State and prove the Pigeonhole principle.
5. How many ways are there to select a first, second and third —prize winners from 10 different people?
6. Discuss the types of phrase-structure grammars and their relations,
7. Give formal definition of regular expressions over a set I.
8. Verify the Handshaking theorem in the figure.



9. Is the graph K4 planar? How?



10. Determine the chromatic number K_n.

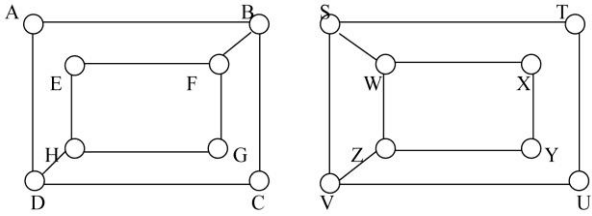
Group B

11. Explain the 2 rules of inference for quantified statements and give suitable examples.

OR

Show that the propositions **p v (q ^r)** and **(r V q)^ (p V r**) are logically equivalent.

12. Define the binomial coefficient and give the general term of the binomial coefficient. Show that the sum of the binomial coefficient is 2^n.
13. How do you distinguish deterministic and nondeterministic finite-state automation? Give suitable examples.
14. Determine whether the graphs shown in the following figure are isomorphic.



What can you say about the graph isomorphism algorithms in terms of efficiency?

15. Prove that a tree with n-vertices has n-1 edges.

Group C **(5x8=40)**

16. Discuss the techniques of direct proof indirect proof and vacuous proof for proving implications with suitable examples.
17. Find the solution to the recursion relation $a_n=6a_{n-1}—11a_{n-2} + 6a_{n-3}$ with initial conditions $a_0=2, a_1=5$ and $a_2 = 15$.

OR

Suppose that a person deposits Rs. 10,000/- in a fixed account at a bank yielding 11% per year with interest compounded annually. How much will be in the account after 10 years? Solve the problem with modeling it into recursion relations.

18. What do you mean by phase- structure grammar? Let C1 be the grammar with vocabulary V = {S, 0, 1}; set of terminals T = {0, 1}, starting symbol S, and productions P {S —> 1lS, S —> 0}. Determine the language L(G) of this grammar.
19. Explain the concept of network flows and max-flow min-cut theorem with suitable examples.

OR

Define Euler circuit and Euler path with suitable examples. Give the multigraph model of the two of Koenigaberg state a necessary and sufficient condition for Euler circuit in connection to your definitions and model.

20. Discuss the Algorithm of Dijkstra for finding the shortest path in a weighted graph between two vertices with suitable example. Moreover, explain the traveling salesman problem and the efficiency of algorithm for solving this problem.

First Year/Second Semester

Subject : Microprocessor (CSc-153) **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Section A

Attempt any two questions: (2x10=20)

1. Draw the block diagram of basic microprocessor and explain it. Which block design is simple and explain it?
2. Why addressing modes are required in the microprocessor? Discuss different types of addressing modes with suitable examples.
3. Write a program in 8-bit Microprocessor to multiply two 16 bits numbers and store in the memory location starting from 3500h. Save the carry bits in the location starting from 3600h.

Section B

Attempt any eight questions: (8x5=40)

4. Differentiate between PUSH and POP operations. Write a program to illustrate the use of PUSH operations.
5. Write an assembly language program to subtract two 16-bit numbers.
6. What do you understand by address decoding in the case of memory interfacing? Explain address decoding using 3 to 8 Decoder.
7. Which 110 interface is used in the 8-bit microprocessor? Explain different types of I/O instructions.
8. Why interrupt is required? Draw the block diagram of interrupt handler and explain it.
9. Explain the Basic DMA Operation with required timing diagram.
10. How can you interface 8086 microprocessor?, , . .
11. How can you achieve pipelining in the basic microprocessor? Explain any type of basic pipelining with suitable diagram.
12. Draw the timing diagram for ADD C and explain it.
13. Write an assembly language program to display a string ”Assembly language coding is difficult” using 16 bit microprocessor code. Assume any necessary data.

Year: 2066

Section A

Attempt any two questions: (2x10=20)

1. Explain the SAPI architecture with suitable block diagram, Compare it with SAP2 architecture
2. Explain the application of flags in the microprocessor. Discuss different types of flags with Suitable examples.
3. Write a program in 8-bit Microprocessor to store 60h, BAh, 7Ch and 10h in the memory location starting from 2000h. Add these data and store the result in 3000h and carry flag in 500lh. Explain all the steps.

Section B

Attempt any eight questions: (8x5=40)

4. Explain about fetch operation and timing diagram.

5. Write an assembly language program to multiply 05h and 06h. Explain all the steps.
6. What are macro assemblers? Explain it.
7. What are the functions of I/O interface? Explain it with suitable example.
8. What do you mean by interrupt? Explain in detail about software interrupt.
9. Explain the Basic DMA Operation with required timing diagram. What are the uses of the DMA transfers?
10. Explain about RS 232 interface with suitable example.
11. Write an assembly language program to display a string "I want to know more about microprocessor" using 16 bit microprocessor code. Assume any necessary data.
12. Why parallel communication is required? Explain with reference to 8-bit system.
13. Differentiate between PUSH and POP operations with suitable example.

Year: 2067

Section A

Attempt any two questions: (2x10=20)

1. Draw the block diagram of SAP2 architecture and explain it. Compare it with SAP1 architecture.
2. Explain the importance of addressing modes in the microprocessor? Discuss different types of addressing modes with suitable examples.
3. Write a program in 8-bit Microprocessor to multiply two 16 bit numbers (ABCDh and 1234h) and store in the memory location starting from 3000h.

Section B

Attempt any eight questions: (8x5=40)

4. Explain execute operation and timing diagram with suitable example.
5. Write an assembly language program to add two 16-bit numbers (3467h and ACDCh).
6. Differentiate between data and address bus with suitable example.
7. Explain different types of I/O instructions used in 8-bit microprocessor.
8. Why interrupt is required? Draw the block diagram of interrupt handler and explain it.
9. Explain the basic DMA Operation with required timing diagram.
10. Explain three types of flags with suitable examples.
11. Why do we require serial communication? Explain with suitable example.
12. Explain about keyboard and display controller.
13. Write an assembly language program to display a string "I like programming in the assembly language" using 16 bit microprocessor code. Assume any necessary data.

First Year/Second Semester

Subject : Data Structure and Algorithm(CSC-154) **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Section A

Attempt any two questions: (2x10=20)

1. What do you mean by binary tree? Explain the binary search tree with example.
2. What do you mean by Recursion? Explain the implementation of factorial and fibonccci sequences with example.
3. Explain the implementation of stack and queue with example.

Section B

Attempt any eight questions: (8x5=40)

4. What are the differences between two dimension array and multidimensional array?
5. What are the major characteristics of algorithms?
6. How can you convert from infix to postfix notation?
7. How can you use Queue as ADT?
8. What is Post-order traversal?
9 What is sorting? Describe the insertion.
10. Explain the binary searching.
11. Differentiate between Pre-order and In order traversal.
12. Explain the tower of Hanoi algorithm.
13. Explain the Kruskal's algorithm.

Year: 2066

Section A

Attempt any two questions: (2x10=20)

1. Write a Menu program to demonstrate the simulation of stack operations in array implementation.
2. State relative merits and demerits of contiguous list and Linked list. Explain the steps involved in inserting and deleting a mode in singly linked of list.
3. A binary tree T has 12 nodes. The in-order and pre-order traversals of T yield the following sequence of nodes:

In-order :	VPNAQRSOKBTM
Pre-order :	SPVONARTOKBM

Construct the Binary tree T showing each step. Explain, how you arrive at solution in brief?

Section B

Attempt any eight questions: (8x5=40)

4. Consider the function:

```
Void transfer (int n, char from, char to, char temp)
{if(n>0)
{Transfer (n — 1, from, temp, to);
Prinif ("\n Move Disk %d from %C to %C", N, from, to);
Transfer (n — 1, temp, to, from);
}
```

Trace the output with the function cell!

Transfer (3, 'R', 'L', 'C');

5. "To write an efficient program, we should know about data structures." Explain the above statement.
6. Write C function to display all items in a circular queue n array implementation. Write assumptions, you need.
7. Divide and conquer algorithm taking reference to Merge Sort.
8. Trace Binary Search algorithm for the data:
   21, 36, 56, 79, 101, 123, 142, 203
   And Search for the values 123 and 153.
9. Differentiate between tree and graph. What are spanning forest and spanning tree. Explain MST (Minimum cost Spanning Tree) problem.
10. A file containing 100 symbols in which following alphabets with their probability of occurrence. Build a Huffman tree according to Greedy strategy.
11. Explain the use of Big-on notation in analyzing algorithms. Compare sorting time, efficiencies of Quick-Sort and Merge-Sort.
12. Explain CLL, DLL, DCLL (Circular, Doubly, Doubly Circular Linked List).

3 Write short notes on (Any Two):

a) Hash function
b) External sorting
e) ADT.

Year: 2066

Section A

Attempt any two questions: (2x10=20)

1. Define stack as ADT. Describe its primitive operations on Array implementation and linked list implementation. .
2. Describe properties of Binary search tree. Write recursive algorithms for constructing BST and its traversals. Illustrate them with an example.
3. What is external and internal sorting? Explain partition strategies of Merge sort and Quicksort. Trace these sort algorithms for following data:
   11, 45, 61, 33, 55, 9, 83, 25.

Section B

Attempt any eight questions: (8x5=40)

4. Write recursive algorithm to get Fibonacci term. Illustrate it drawing recursion tree.
5. Instruct expression tree from the following postfix: AB +C*DC -FG+ $.
6. Differentiate between Singly linked list, DLL, CLL and DCLL.
7. Describe circular Queue operations in array implementation.
8. Compare and Contrast between Binary searching and Binary tree searching.
9. State collision resolution techniques in hashing. Explain Double hashing and Quadratic probing techniques.
10. State MST (Minimum cost spanning tree) problem and shortest path (single source and all other destination) problem. Name the algorithms for solving these problems.
11. Justify the statement: "To write an efficient program, we should know about data structures and Algorithms".
12. Discuss the merits and demerits of contiguous list and linked list.
13. What is priority queue? How it is best implemented?

First Year/Second Semester

Subject : Data Structure and Algorithm(CSC-154) **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Group A **(10x2=20)**

1. Illustrate by an example that a system of linear equations has either exactly one solution or infinitely many solutions.
2. When is a linear transformation invertible?
3. Solve the system $3_{x1}+4_{x2}=3$, $5_{x1}+6_{x2}=7$ by using the inverse of the matrix A = $\begin{bmatrix}3 & 4\\5 & 6\end{bmatrix}$.
4. State the numerical importance of determinant calculation by row operation.
5. State Cramer's Rule for an invertible n x n matrix A and vector b $\in R^n$ to solve the system Ax = b. Is this method efficient from computational point of view? ,
6. Determine if {v1, v2 v3} is a basis for R^3, where $V_1=\begin{bmatrix}1\\0\\0\end{bmatrix}$, $V_2=\begin{bmatrix}1\\1\\0\end{bmatrix}$, $V_3=\begin{bmatrix}1\\1\\1\end{bmatrix}$.
7. Determine if $W=\begin{bmatrix}1\\3\\-4\end{bmatrix}$ is a Nul (A) for $A=\begin{bmatrix}3 & -5 & -3\\6 & -2 & 0\\-8 & 4 & 1\end{bmatrix}$.
8. Show that 7 is an eigenvalue of $A=\begin{bmatrix}1 & 6\\5 & 2\end{bmatrix}$.
9. If S = { u_1,……., u_p } is an orthogonal set of nonzero vectors in R^2, then S is linearly independent and hence is a basis for the subspace spanned by S.
10. Let W = span { x_1, x_2 } Where $X_1=\begin{bmatrix}2\\-5\\1\end{bmatrix}$ and $X_2=\begin{bmatrix}4\\-1\\2\end{bmatrix}$. Then Construct orthogonal basis for W.

Group B **(5x4=20)**

11. Determine if the given set is linearly dependent:
    a) $\begin{bmatrix}1\\7\\6\end{bmatrix}, \begin{bmatrix}2\\0\\9\end{bmatrix}, \begin{bmatrix}3\\1\\5\end{bmatrix}, \begin{bmatrix}4\\1\\8\end{bmatrix}$.
12. Find the 3 x 3 matrix that corresponds to the composite transformation of a scaling by 0.3, a rotation of 90°, and finally a translation that adds (-0.5, 2) to each point of a figure.

OR

Describe the Leontief Input-Output model for certain economy and derive formula for $(I - C)^{-1}$, where the symbols have their usual meanings.

13. Find the coordinate vector $[X]_B$ of x relative to the given basis B = {b1, b2), where $b_1 = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$, $b_2 = \begin{bmatrix} 2 \\ -5 \end{bmatrix}$, $X = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$.

Let $A = b_1 = \begin{bmatrix} 4 & -9 \\ 4 & 8 \end{bmatrix}$, $b_1 = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$, $b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, and basis $B = \{b_1, b_2\}$. Find the B-matrix for the transformation $x \rightarrow Ax$ with $P = \{b_1, b_2\}$.

15. Let u and y be nonzero vectors in R^3 and the angle between them Φ. Then prove that $u.v = \|u\| \|v\| \cos \Phi$ where the symbols have their usual meanings.

Group C **(5x8=40)**

16. Let T: $R^n \rightarrow R^m$ be a linear transformation. Then T is one-to-one if and only if the equation T(x) = 0 has only the trivial solution, prove the statement.

Let $A = \begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 7 \end{bmatrix}$, $u = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$, $b = \begin{bmatrix} 3 \\ 2 \\ -5 \end{bmatrix}$, $c = = \begin{bmatrix} 3 \\ 2 \\ 5 \end{bmatrix}$

And define T: $R^2 \rightarrow R^3$ by T(x)= Ax . Then

(a) Find T(u).

(b) Find an $x \in R^2$ whose image under T is b.

(e) Is there more than one x whose image under T is b?

(d) Determine if c is the range of T.

17. Compute the multiplication of partitioned matrices for

$A = \begin{bmatrix} 2 & -3 & 1 & 0 & -4 \\ 1 & 5 & -2 & 3 & -1 \\ 0 & 4 & -2 & 7 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 4 \\ -2 & 1 \\ -3 & 7 \\ -1 & 3 \\ 5 & 2 \end{bmatrix}$.

18. What do you mean by change of basis in R^n?Let , $b_1 = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$, $b_2 = \begin{bmatrix} -2 \\ 4 \end{bmatrix}$, $c_1 = \begin{bmatrix} -7 \\ 9 \end{bmatrix}$, $c_2 = \begin{bmatrix} -5 \\ 7 \end{bmatrix}$, and

Consider the bases for R^2given by $B = \{b_1, b_2\}$ and $C = \{c_1, c_2\}$.

(a) Find the change of coordinate matrix from C to B.

(b) Find the change of coordinate matrix from B to C.

19. Diagonalize the matrix $A = \begin{bmatrix} -1 & 4 & -2 \\ -3 & 4 & 0 \\ -3 & 1 & 3 \end{bmatrix}$,,if possible.

20. Find the equation $y = \beta_0 + \beta_1 x$ of the least squares line that best fits the data points (2, 1), (5, 2), (7, 3), (8, 3). What do you mean by least squares lines?

First Year/Second Semester

Subject : Linear Algebra(CSc-155) **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Group A **(10x2=20)**

1. When is a system of linear equations consistent and inconsistent?
2. Write numerical importance of partitioning matrices.
3. How do you distinguish singular and nonsingular matrices?
4. If A and B are n×n matrices, then verify withana example that det (AB)=det(A)det(B).
5. Calculate the area of the parallelogram determined by the columns of A=$\begin{bmatrix}2 & 6\\5 & 1\end{bmatrix}$.
6. Determine if w = $\begin{bmatrix}1\\3\\-4\end{bmatrix}$ is in Nul(a, where, A = $\begin{bmatrix}3 & -5 & -3\\6 & -2 & 0\\-8 & 4 & 1\end{bmatrix}$.
7. Determine if {v_1, v_2,v_3} is a basis for λ^3, where v_1=$\begin{bmatrix}1\\0\\0\end{bmatrix}$, v_2=$\begin{bmatrix}1\\1\\0\end{bmatrix}$,v_3=$\begin{bmatrix}1\\1\\1\end{bmatrix}$
8. Find the characteristics polynomial and eigen values of the matrix $\begin{bmatrix}2 & 1\\-1 & 4\end{bmatrix}$.
9. Let $\vec{v}$= (1, -2, 2, 0).Find a unit vector $\vec{u}$ in the same direction as $\vec{v}$.
10. let { $u_{1,\ldots\ldots\ldots\ldots}u_{p}$} be an ortogonal basis for a subspace W of R^n. Then prove that for each y,∈, W, the weights in y= c_1u_1+.....+c_pu_p are given by $c_j=\frac{y.uj}{uj.uj}$
11. prove that any set {v_1,……v_p} in R^n is linearly if p>n.
12. Consider the Leontief input-output model equation x = cx + d where the consumption matrix is C= $\begin{bmatrix}.50 & .40 & .20\\.20 & .30 & .10\\.10 & .10 & .30\end{bmatrix}$
    Suppose the final demand is 50 units for manufacturing 30 units for agriculture, 20 units for services. Find the production level x that willstatisfy this demand.
13. What do you mean by basis of a vector space? Find the basis for the row space of
    A=$\begin{bmatrix}-2 & -5 & 8 & 0 & -17\\1 & 3 & -5 & 1 & 5\\3 & 11 & -19 & 7 & 1\\1 & 7 & -13 & 5 & -3\end{bmatrix}$

    OR

    State the prove the unique representation theorem for coordinate systems.
14. What do you mean by eigen values, eigen vectors and characteristics polynomial of a matrix? Explain with suitable examples.
15. Define the Gram-Schmidt process. Let W=span{x_1, x2}, where x_1=$\begin{bmatrix}3\\6\\0\end{bmatrix}$, x_2= $\begin{bmatrix}1\\2\\2\end{bmatrix}$

    Then construct an orthogonal basis {{v_1, v_2} for w.

Group C **(5x8=40)**

16. Given the matrix $\begin{bmatrix} 0 & 3 & -6 & 6 & 4 & -5 \\ 3 & -7 & 8 & -5 & 8 & 9 \\ 3 & -9 & 12 & -9 & 6 & 15 \end{bmatrix}$, discuss the word phase and backward phase of the row reduction algorithm.

17. Find the inverse of $\begin{bmatrix} 1 & 0 & -2 \\ -3 & 1 & 4 \\ 2 & -3 & 4 \end{bmatrix}$, if exists; by using elementary row reduce the augmented matrix.

18. What do you mean by change of basis in R^n? Let b1= $\begin{bmatrix} -9 \\ 1 \end{bmatrix}$, b_2 = $\begin{bmatrix} -5 \\ -1 \end{bmatrix}$, $b3 = \begin{bmatrix} 1 \\ -4 \end{bmatrix}$, c_2=$\begin{bmatrix} 3 \\ -5 \end{bmatrix}$and onsider the bases for R^2 given by B= {b_1, b2} and C={c_1,c_2} . Find the change of coordinate's matrix from B to C.

19. Diagonalize the matrix $\begin{bmatrix} 2 & 2 & -1 \\ 1 & 3 & -1 \\ -1 & -2 & 2 \end{bmatrix}$, if possible.

OR

Find the eigen values of A=$\begin{bmatrix} 0.50 & -0.60 \\ 0.75 & 1.1 \end{bmatrix}$, and find a basis for each eigen space.

20. Find a least-squares solution for Ax=b with A=$\begin{bmatrix} 1 & -2 \\ 1 & -2 \\ 1 & 1 \\ 1 & 7 \end{bmatrix}$ b==$\begin{bmatrix} -1 \\ 2 \\ 1 \\ 6 \end{bmatrix}$

What do you mean by least-squares problems?

OR

Define a least-squares solution of Ax=b, prove that the set of least-squares solutions of Ax=b coincides with the nonempty set of solution of the normal equations $A^TAx=A^T$

Year: 2066

Group A

Attempt All Questions (10x2=20)

1. Illustrate by an example that a system of linear equations has either no solution or exactly one solution.
2. Define singular and nonsingular matrices.
3. Using the Invertible matrix Theorem or otherwise, show thatA=$\begin{bmatrix} 1 & 0 & -2 \\ 3 & 1 & -2 \\ -5 & -1 & 9 \end{bmatrix}$ is invertible.
4. What is numerical drawback of the direct calculation of the determinants?
5. Verify with an example that det (AB) = det (A). Let (B) for any n x n matrices A and B.
6. Find a matrix A such that w col (A). $w = \left\{ \begin{bmatrix} 6a-b \\ a+b \\ -7a \end{bmatrix} : a,b \in R \right\}$.

7. Define subspace of a vector space with an example.
8. Are the vectors: u=$\begin{bmatrix} 6 \\ -5 \end{bmatrix}$ and v=$\begin{bmatrix} 3 \\ -2 \end{bmatrix}$ eigenvectors of A=$\begin{bmatrix} 1 & 6 \\ 5 & 2 \end{bmatrix}$
9. Find the distance between the vectors u = (7, 1) and y = (3, 2). Define the distance between two vectors in x R.
10. Let w=span {x1, x2} where x1=$\begin{bmatrix} 3 \\ 6 \\ 0 \end{bmatrix}$, x2 =$\begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix}$.

    Then construct orthogonal basis for w.

Group B

Attempt All Questions (5x4 =20)

11. If a set s = {v1... v_p} in R^n contains the zero vector, then prove that the set is linearly dependent. Determine if the set $\begin{bmatrix} 2 \\ 3 \\ 5 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$, $\begin{bmatrix} 1 \\ 1 \\ 8 \end{bmatrix}$ is linearly dependent.
12. Given the Leontief input-output model x=Cx + d, where the symbols have their usual meanings, consider any economy whose consumption matrix is given by C=$\begin{bmatrix} .50 & .40 & .20 \\ .20 & .30 & .10 \\ .10 & .10 & .30 \end{bmatrix}$

    Suppose the final demand is 50 units for manufacturing 30 units for agriculture, 20 units for services. Find the production level x that will satisfy this demand.
13. Define rank of a matrix and state Rank Theorem. If A is a 7 x 9 matrix with a two dimensional null space, find the rank of A.
14. Determine the eigenvalues and eigenvectors of A = $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ in complex numbers.

    Let A=$\begin{bmatrix} 4 & -9 \\ 4 & 8 \end{bmatrix}$, b_1= $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$,$b_2$= $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$ and basis B= {b_1,b_2}. Find the B-matrix for the transformation Ax → x with P = [b_1, b2].
15. Let u and v be nonzero vectors in R^2 and the angle between them be θ then prove that u.v =||u|| ||v||cos θ, where the symbols have their usual meanings.
16. Line if the following homogeneous system has a nontrivial solution. Then describe the solution set. $3x_1 + 5x_2 — 4x_3 = 0$, $-3x_1 - 2x_2 + 4x_3 = 0$, $6x_1 + x_2 — A8x_3 = 0$.
17. An n x n matrix A is invertible if and only if A is row equivalent to In, and in this case,any sequence of elementary row operations that reduces A to In also transforms I into A^{-1}. Use this statement to find the inverse of the matrix A = $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 3 \\ 4 & -3 & 8 \end{bmatrix}$, if exists.
18. What do you mean by basis change? Consider two bases B = {b_1, b_2} and c = {c_1, c_2} for a vector space V, such that $b_1 = 4c_1 + c_2$ and $b_2 = 6c_1 + c_2$. Suppose $[X]_B$ = $\begin{bmatrix} 3 \\ 1 \end{bmatrix}$ i.e., x=3b1 +b2. Find$[x]_C$.

    Define basis of a subspace of a vector space.

Let $V_1=\begin{bmatrix}0\\2\\-1\end{bmatrix}$, $V_2=\begin{bmatrix}2\\2\\0\end{bmatrix}$, $V_3=\begin{bmatrix}6\\16\\-5\end{bmatrix}$, where $v_3=5v_1+3v_2$, and let H span $\{v_1, v_2, v_3\}$.

Show that span {v1, V2, V3} = span $\{v_1, v_2\}$ and find a basis for the subspace H.

19. Diagonalize the matrix $A=\begin{bmatrix}2&4&3\\-4&-6&-3\\3&3&1\end{bmatrix}$, if possible.

20. What do you mean by least — squares lines? Find the equation $y = \beta_0 + \beta_2 x$ of the least squares line that fits the data points (2,1), (5,2),(7,3),(8,3).

OR

Find the least — squares solution of Ax = b for

$A=\begin{bmatrix}1&3&5\\1&1&0\\1&1&2\\1&3&3\end{bmatrix}$ $b==\begin{bmatrix}3\\5\\7\\-3\end{bmatrix}$

First Year/Second Semester

Subject : STA. 159 - Statistics II **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Group A

Answer any two questions (10x2=20)

1. Describe a situation where multistage sampling is an appropriate method of drawing a random sample. Clearly state the procedure of drawing random sample in two-stage sampling plan. In two-stage sampling with random sampling without replacement at both stages obtain an expression for an unbiased estimator, of the population, total, and derive the expression for the unbiased estimator. Hence, in particular case (when $M_i = M$ and $m_i = m$ for all i), obtain the simplified version of the unbiased estimator and variance of the unbiased estimator.
2. What do you mean by Latin Square Design (LSD)? Write and explain the statistical model for m x m LSD. Give the statistical analysis of m X m LSD with one observation per cell.
3. (a) What is questionnaire? What are the requisites of a good questionnaire?
   (b) Explain the effect model $y_{ij} = \mu+\tau_i+e_{ij}$, i= 1,2,...,a and j = 1,2,. ..,n with the assumptions made on y_{ij}. Why the assumptions are required?

Group B

Answer any eight questions (8x5=40)

4. The following table summarizes population size (N_h) and population variance (S_h^2) of four strata. Compute the variance of the stratified estimator $\bar{y}_{st}$ of the population mean for proportional allocation of a total sample of size 100.

H	1	2	3	4
N	14000	3000	1500	1500
S	34	94	175	319

2. Describe the procedure of drawing a linear systematic sample of size n from a population consisting of N units when N = n x k where k is a positive integer. Write down the problem of drawing a linear systematic sample of size 4 from a population consisting of 17 units, numbered from 1 to 17.
3. In pps with replacement sampling, show that an unbiased estimator of Population total Y is $\hat{Y}_{pps}=\frac{1}{n}\sum_{i=1}^{n}\frac{y_i}{p_i}$ .Derive the expression for the variance $\hat{Y}_{pps}$..
4. Clearly state the procedure of drawing a random sample in cluster sampling plan. In a simple random sampling without replacement of n clusters from a population of N clusters each containing M elements, derive an unbiased estimator of the parameter $\bar{\bar{Y}}$, population mean per element.
5. Describe census and sample survey. Write down the advantages of sample survey over census. Write down the major steps involved in a sample survey.
6. Explain the terms: factor, experimental units, treatment, and experimental error with suitable examples.
7. In a single factor model $y_{ij} = \mu+\tau_i+e_{ij}$, show that

$$\sum_{i=1}^{a}\sum_{j=1}^{n}(y_{ij}-\bar{y}_{..})^2 = n\sum_{i=1}^{a}(y_{i.}-\bar{y}_{..})^2 + \sum_{i=1}^{a}\sum_{j=1}^{n}(y_{ij}-\bar{y}_{i.})^2$$

What is significance of this result in experimental design?

8. State the mathematical model with the hypotheses to be tested in a two-way ANOVA .Write down the ANOVA table for a two-way ANOVA.
9. Consider the partially completed ANOVA table below. Complete the ANOVA table and answer the followings. What design was employed? How many treatments were compared? How many observations were analyzed? At the 0.05 level of significance, can one conclude that the treatments have different effects? Why?

Source	SS	df	MS	F
Treatments	231.50	2		
Blocks		7		
Error	573.75			
Total	903.75	23		

10. The results of 2^2 experiments with 3 replications are presented below. Estimate the main effects, interaction effect, SS_A, SS_B and SS_{AB}. Which effects appear to be large?

Treatment Combination	Replication		
	I	II	III
1	22	30	25
A	32	42	29
	35	33	50
Ab	55	45	46

Bachelor Level / First Year/Second Semester/Science

Subject : Statistics II STA159 **FM : 60**
Time : 3 hours **PM : 24**

Year: 2066

Group A

Answer any two questions (10x2=20)

1. Describe a situation where probability proportion to size (pps) sampling is an appropriate method for drawing a random sample. Clearly state the procedure of drawing a random sample in pps sampling plan. In pps sampling with replacement derive an unbiased estimator of the parameter Y, population total, and, also, derive the variance of the estimator.
2. What do you mean by Completely Randomized Design (CRD)? Write and explain the statistical model for CRD .Give the statistical analysis of CRD with one observation per cell.
3. (a) Write down the major steps of a sample survey and state the major sources of errors in a Sample survey.
   (b) Write down the basic principles of experimental designs and explain the term Experimental errors.

Group B

Answer any eight questions (8x5=40)

4. Following table summarizes information related to four strata. Compute the variance of the stratified estimator $\ddot{y}_{st}$ of the population mean assuming proportional allocation of a total sample of size 100.

h	1	2	3	4
N_h	200	400	300	100
S^2_h	9	4	4	9

5. Describe the situation where the systematic sampling is useful. Write down the problem of drawing a linear systematic sample of size 4 from a population consisting of 17 units, numbered from 1 to 17.
6. In two stage sampling with simple random sampling without replacement at both stages, an unbiased estimator of Y is Ÿ= J Derive the variance of the above estimator.
7. Clearly state the procedure of drawing a random sample in cluster sampling plan, In a simple random sampling without replacement of n clusters from a population of N clusters each containing M elements, derive an unbiašed estimator of the parameter $\bar{\bar{Y}}$,population mean per element.
8. Describe census and sample survey. Write down the advantages of sample survey over census. Write down the major steps involved in a sample survey.
9. Explain the terms: factor, experimental units, treatment, and experimental error-with suitable examples.
10. Write down (a) layout of two-way ANOVA with its assumptions, (b) effect model and (c) ANOVA table.
11. In a single factor model $y_{ij} = \mu+\tau_i+e_{ij}$, show that:

$$\sum_{i=1}^{a}\sum_{j=1}^{n}(y_{ij}-\bar{y}_{..})^2 = n\sum_{i=1}^{a}(y_{i.}-\bar{y}_{..})^2 + \sum_{i=1}^{a}\sum_{j=1}^{n}(y_{ij}-\bar{y}_{i.})^2$$

What is significance of this result in experimental design?

12. Fill in the ( ) in the following ANOVA table of Latin Square Design.

Source Of Variation	Sum Of Squares	Degrees of Freedom	Mean Square	F-Value
Rows				
Columns			36	
Treatments		180		
Error	6		12	
Total				

13. The results of 22 experiments with 3 replications are presented below. Estimate the main effects, interaction effect, SSA, SSB and SSP. Which effects appear to be large?

EXPERIMENT	Replication		
	I	II	III
	22	30	25
	32	42	29
	35	33	50
	55	45	46

Year: 2067

Group A

Answer any two questions (10x2=20)

1. Describe a situation where cluster sampling is appropriate for drawing random sample. Clearly state the procedure of drawing a random sample in cluster sampling plan. In a sampling without replacement of n clusters from a population of N clusters each containing M elements, derive an unbiased estimator of the parameter $\bar{\bar{Y}}$, population mean per element, and, also, derive the variance of the estimator.
2. (a) Explain the terms: a random sample, sampling frame, sampling error and non-sampling error.
   (b) Explain the terms: factor, experimental units, treatment, and experimental error.
3. What do you mean by Randomized Block Design (RBD)? Write and explain the statistical model for RBD. Give the statistical analysis of RBD with one observation per cell.

Group B

Answer any eight questions (8x5=40)

4. The following table summarizes population size (N_h) and population variance (S_h^2) related to four strata. If the required sample size is 4000, what are the sample sizes that would be drawn from each stratum for (a) proportional allocation, and (b) optimum allocation assuming the survey cost per unit is same in each stratum.

H	1	2	3	4

N_h	14000	3000	1500	1500
S^2_h	34	94	175	319

14. Describe the procedure of drawing a linear systematic sample of size n from a population consisting of N units when N = n x k where k is a positive integer. Write down the problem of drawing a linear systematic sample of size 4 from a population consisting of 17 units, numbered from 1 to 17.
6. In pps with replacement sampling, show that an unbiased estimator Of Population total Y is $\hat{Y}_{pps}=\frac{1}{n}\sum_{i=1}^{n}\frac{yi}{pi}$ .Derive the expression for the Variance $\hat{Y}_{pps}$..
7. In two-stage sampling with simple random sampling without replacement at both stages, show that an unbiased estimator of Y is $\hat{Y}=\frac{N}{n}\sum_{i=1}^{n}\frac{Mi}{mi}\sum_{j=1}^{mi}y_{ij}$

   What would be the above expression if $M_i = M$ and $m_i = m$ for all i?
8. What is questionnaire? Explain. Write down the prerequisites of a good questionnaire?
9. Write down the principles of experimental design.
10. In a single factor model $y_{ij} = \mu + \tau_i + e_{ij}$, show that

$$\sum_{i=1}^{a}\sum_{j=1}^{n}(y_{ij}-\bar{y}_{..})^2 = n\sum_{i=1}^{a}(y_{i.}-\bar{y}_{..})^2 + \sum_{i=1}^{a}\sum_{j=1}^{n}(y_{.ij}-\bar{y}_{i.})^2$$

    What is significance of this result in experimental design?
11. Consider the partially completed ANOVA table below. Complete the ANOVA table and answer the followings. What design was employed? How many treatments were compared? How many observations were analyzed? At the 0.05 level of significance, can one conclude that the treatments have different effects? Why?

Source	SS	df	MS	F
Treatments	231.50	2		
Blocks		7		
Error	573.75			
Total	903.75	23		

12. Write down statistical model for a Latin Square Design (LSD) and explain it. Also, write down the ANQVA table for LSD.
13. Write down the four treatment combinations of 2^2 experiment using standard notations. Write down the expressions for computing main effects, interaction effect, SS_A, SS_B and SS_{AB} if experiment is replicated r times.

First Year/Second Semester

Subject : Physics II (CSc-156) **FM : 60**
Time : 3 hours **PM : 24**

Year: 2065

Long Answer Questions:

Attempt any four questions: (7x4=28)

1. Write Maxwell-Boltzmann distribution for number of particles of gas with energy and apply it to calculate the average energy of monoatomic ideal gas. Show the average energy per molecule is 3/2 kT.
2. Consider a particle of mass in a one dimensional rigid box of length 1. Find the energy and wave function of the particle.
3. Electrons in a metal can be considered as an ideal gas. Their random velocity is caused by thermal motion. Show that electrical resistivity of this electron gs increases as $T^{3/2}$. Treat the electron gas classically.
4. (a) $\psi(x)$ is the wave function of a quantum mechanical particle. Derive the expressions for probability density and probability current density in terms of $\psi(x)$.
   (b) A simple cubic structure is given by a unit cell, which is a cube of side 'a' and one atom sits at each corner of the cell. How many atoms are there in a unit cell and what is the number of nearest neighbour for any given atom? Write your arguments and show all your work.
5. What do you mean by intrinsic and extrinsic semiconductors? Show that Fermi level in an intrinsic semiconductor lies in the middle of the forbiolden gap.

Group B

Short Answer Questions:

Attempt any eight questions: (8x4=32)

6. Write the formula for Fermi-Dirac and Bose-Einstein distribution laws and discuss their ssalient features.
7. What are de Broglie waves associated with a material particle? An electron is moving with kinetic energy 1 KeV. Determine the de Broglie wave length of the electron.[$m_e = 9.1 * 10^{-31}$ kg , $h = 1.06 * 10^{-34}$ Js, 1 eV = $1.6 * 10^{-19}$ J].
8. An electron is confined in a layer of thickness 15 A. Calculate the uncertainty in its momentum.
9. Express the momentum operators in differential form and calculate its commutator with x, i.e calculates [p, x].
10. The crystal of a lattice of a crystal is given by a set of three vectors $\mathbf{a_1}$, $\mathbf{a_2}$and $\mathbf{a_3}$. Define the reciprocal lattice vectors and calculate the volume of the reciprocal lattice unit cell. (2+2)
11. The number of electrons per unit volume available for conduction in sodium metal is $2.5 * 10^{28}$ electrons per m^3. Calculate the Fermi energy and Fermi temperature.

($h = 1.05 * 10^{-34}$ Js^{-1}, mass of electron = $9.11*10^{-31}$ Kg, Boltzmann constant k = $1.381 * 10^{-23}$ $JK^{-1} = 8.617*10^{-5}$ eKV^{-1}). (2+2)

12. What are Schottkyjunctions? Discuss their chaacteristics and advantages over conventional p-n junction diodes.
13. In an extrinic semiconductor there are 10^{14} donors per cm^3. Their ionization energy is E_d=0.005eV and effective mass is $0.01*m_e$(m_e is the electronic mass). Estimate the density of the conductionelectrons at T = 100k.
14. What is effevitve mass of carriers in a solid? Derive an expression for the effevtive mass of carriers in a semiconductor.
15. The gap energy in germanium crystal is 0.70eV. Calculate the temperature at which the number of conduction electrons increases 10 fold over the same number at the room temperature.

Year: 2066

Long Answer Questions:

Attempt any four questions: (7x4=28)

1. Derive Bose-Einstein Distribution Law.
2. Establish Schrodinger's equation for linear harmonic oscillator and solve it to obtain its eigen values.
3. Explain Miller indices. Draw the following indices in a cubic unit cell: (200), (110), (111), (010).
4. What are holes and electrons in a semiconductor? Derive an expression for their concentration with temperature.
5. a) Write the postulate of quantum mechanics. Expalin the physical significance of wave function.
   b) Explain entropy and probability relate between them .

Group B

Short Answer Questions:

Attempt any eight questions: (8x4=32)

6. If the Fermi energy of a metal in 10 ev, what is the corresponding classical temperature.
7. Calculate the be-Broglie wavelength of a ball of mass 10^{-3} Kg moving with a velocity of 10^3 ms^{-1}. ($h=6.6*10^{-34}JS$)
8. Calculate the first two energy levels of an electron in a box 10^{-8}m wide.
9. Calculate the inter planer spacing for (110) plane in simple cubic lattice whose lattice constant is $4.2*10^{-10}$m.
10. Write the seven systems of crystals with suitable diagram.
11. Find the uncertainity in position of an electron moving with a velocity $3*10^7 ms^{-1}$.
12. Compare M – B, F – D, B – E statics.
13. Write Hamiltonian of hydyogen atom in cartesion coordinate syatem.
14. Calculate wave length of electron. Which is accelerated through a potential of 10 volts?
15. Given $\psi(x) = Ce^{iKX}$. By using normalization find the value of C.

Year: 2067

Long Answer Questions:

Attempt any four questions: (7x4=28)

1. Show that S=Klogw where S is entropy, W is probability and K is a constant.
2. Calculate the values of the energy of a particle in one dimensional box. Indicate graphically the first three wave function for such a particle.
3. The random velocity of the electron was due to the thermal motion of electron gas then show that the electricity resistivity would increase with temperature as $T^{3/2}$.
4. Discuss the formation of n-type and p-type semiconductor. Derive an expression for the concentration of the hole and electron in these semiconductors.
5. What is significance of wave function? Derive Schrodinger wave equation.

Group B

Short Answer Questions:

Attempt any eight questions: (8x4=32)

6. Calculate the wavelength of an electron (m=9.1 x 10^{-31} kg) accelerated through a potential of 100 volts. (4)
7. The wave function ψ=Asin (n∏x/L) is given. By using normalization show that A= $\sqrt{2/L}$
8. Write Hamiltonian for the hydrogen atom in terms of spherical polar coordinate.
9. Calculate the inter planer spacing for a (321) plane in simple cubic lattice whose lattice constant is 4.2 x 10^{-10} m.
10. Calculate the concentration of conduction electron and Fermi energy of Copper. Given that copper has a mass density ρ_m=3.95 g cm^{-3}.
11. If the position of electron (m=9.1 x 10^{-31} kg) in H atom could be determined with an accuracy of 0.01mm, what would b the uncertainty in it'svelocity.
12. If the Fermi energy of metal is 10 ev, what is the corresponding classical temperature.
13. Make a comparison of Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics.
14. Discuss Bravais lattices and give different type of crystal structure.
15. Diamond and Silicon have similar electronic configuration and crystal structure. Discuss why the former an insulator Whilethe lattes is a semiconductor is.

CSIT Questions Collections 2068

Second Year/ Third Semester

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
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

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?
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.
   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.

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
f(x)	-1	-9	11	69

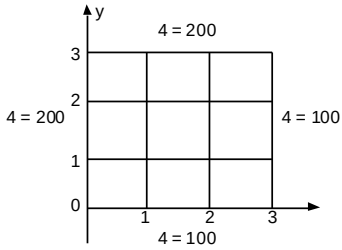
3. Write Newton-cotes integration formulas in basic form for x=1, 2, 3& give their composite rules. Evaluate $\int_0^1 e^{-x2}\,dx$ using the Gaussian integration three point formula. (4+4)
4. Solve the following system of algebraic linear equation using Gauss-Jordan lgorithm. (8)

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

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)
3. Evaluate I= $(_0^1$ e $^{-x2}$ 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^oC and other sides are held at 0^oC. Find the temperature at interior points, assuming the grid size of 10*10 cm. (3+5)

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.
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.

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.

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

"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.

CSIT Questions Collections 2068

Second year/Fourth Semester

Subject : Theory of Computation **FM : 80**
Time : 3 hours **PM : 32**

Year: 2067

Attempt all the questions.

Group A (8x4=32)

1. Define Finite Automata with εmoves. Is ε NFA has more computation power than DFA?
2. Give the DFA accepting the strings over {a, b} such that each string does not start with ab.
3. Give the regular expression for the following languages.
   a. L= {SS ϵ {a, b}* and S starts with aa or b and does not contains substring bb .
   b. L= {S | S ϵ {0, 1}* and 0 occurs in pairs if any and ends with 1.
4. Convert following regular grammar in to Finite Automata.
   S → aaB | aB | ε, B → bb | bS | aBB
5. Convert following grammar into a equivalent PDA
   S →AAC, A→aAb | ε, C → ac | b | ab
6. What is a multi track Turing Machine? How it differs with single track machine?
7. Construct a Turing Machine that accepts the language of palindrome over {a, b}* with each string of odd length.
8. What is an algorithm? Explain on the basis of Church Hypothesis.

Group B (6x8=4)

9. How a ε- NFA can be converted into NFA and DFA? Explain with a suitable example.
10. Find the minimum state DFA equivalent to the following DFA.

State	0	1
→A	B	C
B	B	D
C	E	D
D	E	D
*E	A	D

11. Show that a language L is accepted by some DFA if and only if L is accepted by s.
12. Define the language of PDA that accepts by Final State. Explain how a PDA accepting empty stack can be converted into a PDA by final state.
13. Explain about multi tape TM. Show that every language accepted by a multi-tape Turning Machine is also accepted by one tape Turning Machine.
14. Write short motes on:
    a. Decidable Vs Un-decidable problems.
    b. Unrestricted Grammar
    c. NP-completeness
    d. CNF-SAT Problem.

Year: 2067

Attempt all the questions.

Group A (8x4=32)

1. What is DFA? How it differ with a NFA? Explain.
2. Give the DFA for language of strings over ***{0, 1}***in which each strings end with 11.
3. For a regular expression **(a+b)*baa,** construct ε-NFA.
4. Define the term parse tree, regular grammar, sequential form and ambiguous grammar.
5. Give the formal definition of NPDA. How it differs with DPDA? Explain.
6. Construct a Turning Machine that accepts a language of strings over (a, b) with each string of even length. Show how it accepts string **abab**.
7. Give the formal definition of Turning Machine. How it differs from PDA?
8. Explain about the Unrestricted Grammar.

Group B (6x8=4)

9. Show that a language L is accepted by some DFA if and only if L is accepted by some NFA.
10. State and prove pumping lemma for regular language. Show by example how it can be used to prove a language is not a regular.
11. Define Context Free Grammar. Given the following CFG.
    S→0AS | 0,A→SIA | SS | 10
    For the string 001001100, Give the left most and right most derivation and also construct a parse tree.
12. Define deterministic PDA. Design a PDA that accept a language L = $\{a^n b^n \mid n>0\}$. You may accept either by empty stack or by final state.
13. Describe a Universal Turing Machine and its operations. What types of languages are accepted by Universal TM?
14. Explain about the Chomsky Hierarchy of the language.

Second year/Fourth Semester

Subject : Computer Graphics **FM : 60**
Time : 3 hours **PM : 24**
All questions carry equal marks.

Year: 2067

Attempt all questions.

1. What is a computer graphics? Explain in detail about the application of computer graphics.
2. Derive the window to viewport transformation coefficient matrix. Explain the application of this matrix.
3. Explain the following term with practical applications.
   (a) 3D Rotation
   (b) 2D Shear
4. Explain in detail about line clipping algorithm and its applications.
5. What is a digital differential analyzer (DDA)? How can you draw the line using this algorithm?
6. How can you represent 3D object? How can you draw the line using this algorithm?
7. How curves be generated? Explain it with any suitable algorithm.
8. Explain in detail about plain equation method. Explain which algorithm is better for hidden surface removal.

   OR

   Explain in detail about depth buffer method. Justify that is better than plane equation method.
9. Consider 256 pixel X 256 scan lines image with 24-bit true color. If 10 minutes video is required to capture, calculate the total memory required? Why intensity assignment is required?
10. Why shedding is required in the computer graphics? Explain in detail about constant intensity shading.

    OR

    List the different type of shading models. Explain in detail about Gouraud shading model.

Year: 2067

Attempt all questions.

1. What is a random scan display system? Draw its block diagram and explain it in detail.
2. What do you mean by homogeneous coordinates? Explain it with equation and practical application.
3. Explain the following terms with practical applications.
   a. 3D Mirror
   b. 2D Rotation
4. Explain in detail about circle clipping algorithm. Where do you require circle clipping algorithm?
5. How can you draw circle? Explain with algorithm.

6. Explain in detail about polygon table. How can you apply in the case of computer animation?
7. What is a polygon mesh? Explain the application of polygon mesh with example.
8. Justify that hidden surface removal is required in computer graphics. Explain in detail about depth buffer method.

OR

Explain in detail about scan line method. Just that it is better than depth buffer method.

9. Consider 256 pixels X 512 scan lines image with 24-bit true color. If 20 minutes video is required to capture, calculate the total memory required? What is the color intensity model?
10. Explain in detail about Phong shading. How can you modify Phong shading model?

OR

Explain in detail about Gourand shading model. Compare it with Phong shading model.

Second year/Fourth Semester

Subject : Database Management System **FM : 60**
Time : 3 hours **PM : 24**
All questions carry equal marks.

Year: 2066

Attempt all questions.

1. Answer the following questions in short:
   a) Differentiate between logical data independence and physical data independence.
   b) Three-schema architectures.
   c) Differentiate between database schema and a database state.
   d) Different type of data attributes.
   e) The difference among a relationship instance, a relationship type, and relationship set.
2. a) Draw an ER diagram for database showing Bank. Each Bank can have multiple branches, and each branch can have multiple accounts and loans.
   b) In what sense does a relational calculus differ from relational algebra, and in what sense are they similar?
3. Assume a database about Company.
   EMPLOYEE (ss#, name)
   COMPANY (cname, address)
   WORKS (ss#, cname)
   SUPERVISE (superviser_ss#, employee_ss#)
   a) Write relational algebra and SQL queries for each of the following cases.
      i) Find the names of all supervisors that work in companies whose address equals 'pokhara'.
      ii) Find the name of all the companies who have more than 4 supervisors.
      iii) Find the name of supervisor who has the largest number of employees.
   b) What is a view in SQL and how it is defined? Explain how vies are typically implemented.
4. a) Define a first, second, and third normal forms with suitable examples.
   b) What is a functional dependency? When are two sets of functional dependencies equivalent? How can we determine their equivalence?
5. a) Discuss the ACID properties of a database transaction with suitable example.
   b) Describe the serial and serializable schedule? Why serializable schedule is consider correct?
6. a) How does the granularity of data items affects the performance of conurrency control? What factors affect selections of granularity size for data items?
   b) Describe the two-phase commit protocol for database transaction.

Year: 2066

Attempt all questions.

1. Answer the following questions is short. (5x2=10)
   a Advantage of DBMS approach over file system approach.
   b Differentiate between two-tier and three-tier client/server architecture.
   c What is weak entity, owner entity type and identifying relationship?
   d The null value attribute and its uses.

e Recursive relationship type with suitable example.

2. a) Draw an ER diagram for a database showing Hospital system. The Hospital maintains data about Affiliated Hospitals, type of Treatments facilities given at each hospital, and Patients (6)
   b) What is join operation? Differentiate between equijoin and natural join with suitable example. (4)

3. Assume database about **Company**
   EMPLOYEE (ss#, name)
   COMPANY (cname, address)
   WORKS (ss#, cname)
   SUPERVISES (supervisor_ss#, employee_ss#)
   a) Write relational algebra and SQL queries for each of the following cases. (5)
      i) Find the names of supervisors that work in companies whose address equals '**Kathhmandu'**
      ii) Find the names of all the companies who have more than 4 supervisors.
      iii) Find the name of the supervisor who has the largest number of employees.

   b) How can define view in SQL? Explain the problems that may arise when one attempts to update a view. (1+4)

4. a) What are different update anomalies? Explain each in with suitable examples. (1+4)
   b) Define functional dependency. Describe the closure of a set of functional dependencies with an example. (1+4)

5. a) Draw a state diagram, and discuss the typical state that a transaction goes through during transaction. (5)
   b) Which of the following schedule is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules. (5)
   i) r1(x);r3(x); w1(x);r2(x);w3(x);
   ii) r1(x);r3(x); w3(x);w1(x);r2(x);
   iii) r3(x);r2(x); w3(x);r1(x);w1(x);
   iv) r3(x);r2(x); r1(x);w3(x);w1(x);

6. a) Discuss the problems of deadlock and starvation, and the different approaches to dealing with these problems. (5)
   b) Describe write-ahead logging protocol (5)

Second year/Fourth Semester

Subject : System analysis and Design **FM : 60**
Time : 3 hours **PM : 24**
All questions carry equal marks.

Year: 2066

Group A
Long Answer Questions:

Attempt any two: (2x10=20)

1. What do you mean by system analysis? Explain the system development life cycle with example.
2. Draw a DFD diagram of following up to level 2.
   Customer sends enquiry to commercial department, receives quotations from the sales department and places an order. Based on the customer order, the work order is sent to the planning department for planning scheduling and control, in turn, the planning department raises a job order on the "shop floor". On completion, delivery note and invoice are made out costing department also prepares an orderwise comparative statement of estimated and actual costs.
3. How can you transforming E-R diagram into relations? Explain with suitable example.

Group B
Short Answer Questions:

Attempt any eight: (8x5=40)

4. What are the system analyst and design tools?
5. Design the E-R diagram of the following.
   a) Customer with draws money from his account.
   b) Student attends classes.
6. Explain the data dictionaries with example.
7. Explain the cost-benefit analysis with example.
8. What is the difference between a 2 NF and 3NF relations?
9. What do you mean by file organization?

Year: 2067

Group A
Long Answer Questions:

Attempt any two: (2x10=20)

1. Explain the steps in the maintenance process and contrast them with the phase of the systems development life cycle.
2. Draw a DFD diagram of the following up to level 2.
   Front office of Hotel is responsible for all room reservations, room allocations and final settlement of bills. Any company or person can reserve rooms for their future stay. They have to indicate from what date to what day they need the room. They also have to indicate how many rooms are required. Sometimes the reservations could be cancelled or the dates or number of rooms changed. For reservation, cancellation or modification or rooms, customer receives an acknowledgement from the hotel.

3. Explain the steps of creating a decision table. How can you reduce the size and complexity of a decision table? Explain with example.

Group B

Short Answer Questions:

Attempt any eight: (8x5=40)

4. Differentiate between transaction processing system (TPS) and management information system (MIS).
5. What are the management skills needed by system analysts?
6. What are the three relationship types of E-R diagrams? How are these relationships paired to build an E-R diagram?
7. Describe the commonly used methods for performing economic cost-benefit analysis.
8. What is the normalization of a relation? Explain with example.
9. Explain the six types of files used in information systems.
10. What is the role of software application testing?
11. Explain the factors that influence the cost of maintenance.
12. What managerial issues can be better understood by measuring maintenance effectiveness? Explain.
13. Differentiate between state diagrams and sequence diagrams in object oriented analysis and design.

Second year/Fourth Semester

Subject : Technical writing **FM : 60**
Time : 3 hours **PM : 24**
Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.

Year: 2067

1. Describe how you can use the online help or manual to find how to add a customized dictionary for technical words in your computer, and once added, how to open or close the dictionary.
2. What is communication? What are the factors to consider in technical communication?
3. Arrange the following transition words into the categories of sequence, Examples, Contrast, and Conclusion, and then use the transition words in your own sentences.
   then, nevertheless, consequently, let us say, for instance, however, instead, in addition, therefore, finally, particularly, in short, thus, such as, for example, otherwise.
4. Write a sample cover letter to accompany your resume for a position in your field to the following person.
   Mr. R. C. Shrestha
   Uni Tech International
   GPO Box 00000
   Kathmandu
5. Give instructions for operating a personal computer.
6. Explain computer –aided writing or explain what informative summaries are.

Year: 2067

1. Write a one-paragraph description of how you can improve your writing. Begin with a topic sentence. In the rest of paragraph, add the details that support your topic sentence.
2. Edit the adjectives in the following sentences to make them correct and clear
   a) Blue looks more better on you than gray.
   b) The reception was a really nice part.
   c) My manager is really a nice person.
   d) That is the baddest-looking outfit I have ever seen.
   e) Meeting the president was a most unique experience for me.
   f) We had the seriousest conversation of the evening
   g) I think she was more sharp than anyone else in the party
   h) The clock is much more slower than my watch.
3. Write five common acronyms in your area of study and their expanded meanings.
4. Describe briefly the layout of a business letter
5. Write short notes on **(any two)**:
   a) Writing with a computer
   b) Writing in examinations
   c) The use of headings
   d) Language and style
   e) Transition words
   f) The use of commas and semicolons
6. Write a letter to a business associate thanking him for referring a customer to you.

Second year/Fourth Semester

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

Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.
All questions carry equal marks.

Year: 2067

Attempt all the questions.

1. Why cognitive science is important in the computer science? Compare it with philosophy and explain it with suitable examples.
2. Define and explain artificial intelligence. Act rationally is an important part of artificial intelligence, justify it with suitable example.
3. The object based system can represent knowledge, explain it with practical examples.
4. Explain the algorithm of breath first search with suitable example. How can you modify it, explain.

OR

What do you mean by A* search? Explain it with an algorithm and suitable example.

5. Why Turing machine is required? Design a Turing machine with finite west of states as q0, q1, and q2, alphabets are "a" and "b", initial state is q0 and assume 5 suitable transitions.
6. List down the all Chomsky hierarchies. Explain in detail about type 0 with practical examples.
7. Explain the mathematical model of neural network system with suitable example. Also explain the importance of neural networks.
8. Explain the perceptron with suitable practical example and algorithm.
9. Explain penrose approach in the cognitive science. What is its relations with Descartes, explain with suitable example.
10. Why lexicon and morphology are required in natural language processing, explain suitable example?

OR

What are the parameters of language processing? Explain in detail about syntax with suitable example.

Year: 2067

Attempt all the questions.

1. Compare cognitive science with sociology and explain it with examples. Differentiate between linguistics of artificial intelligence?
2. Differentiate between think humanly and act humanly with suitable examples. What are the applications of artificial intelligence?
3. What do you mean by first order predicate logic? Explain it with practical example
4. Differentiate between depth first search and breadth first search with example.

OR

Differentiate between hill-climbing search and A* search with example.

5. Design a Turing machine with finite set of states as q_0 and q_1, alphabets are 'a', 'b', and 'c', initial state is q_0 and assumes 5 suitable transitions. What are the practical applications of Turing machine
6. Differentiate between types I and type II Chomsky hierarchies with examples. Explain the role of Chomsky hierarchy in the computation?
7. Explain the biological neuron. Explain the mathematical model of neural network system with suitable example.
8. Explain the back propagation practical example and algorithm.
9. Explain Searle approach in the cognitive science. What is its relation with Descartes, explain with example.
10. How can you generate parse tree in the natural language processing? Explain it with example.

OR

Differentiate between syntax and semantics in the natural language processing. How can you modify it with pragmatic approach?

CSIT Questions Collections 2068

Third Year/ Five Semester

Third year/Five Semester

Subject : Computer Networks CSC 301 **FM : 60**
Time : 3 hours **PM : 24**
Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.

Year: 2067

Group 'A'
Long answer questions

Attempt all questions. (2x10=20)

1. Explain the principles of application layer protocols. What do you mean by file transfer?

OR

What are the main relationship between transport layer and network layer? What are the transport layer uses in Internet?

2. Explain the congestion control principle and its approaches.

Group 'B'
Short Answer Questions

Attempt any eight questions. (8x5=40)

3. Explain the connection oriented and connectionless service.
4. Explain the working principle of DNS.
5. What do you mean by pipelined reliable data transfer protocol?
6. What do you mean by hierarchical routing?
7. Explain the multicasting routing and its applications.
8. Define Data link layer and its services.
9. Mention the types of multimedia networking applications.
10. What are the key components of network management architecture?

Year: 2068

Group 'A'
Long answer questions

Attempt all questions. (2x10=20)

1. Explain the OSI reference model.

OR

What do you mean by TCP? Explain the TCP structure.

2. Define DNS. Explain the DNS records and DNS messages.

Group 'B'
Short Answer Questions

Attempt any eight questions. (8x5=40)

3. What do you mean by internet protocol stack?
4. Differentiate between transport layer and network layer.
5. Explain the principle of congestion control.
6. What do you mean by IP datagram fragmentation?
7. Explain the point to point protocol (PPP).
8. What do you mean by multicasting routing?
9. Explain the Internet Control Message Protocol (ICMP).
10. What are the various types of multimedia networking application? What types of intra structure is needed for network management?

Third year/Five Semester

Subject : Artificial Intelligence CSC 304 **FM : 60**
Time : 3 hours **PM : 24**
Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.

Year: 2067

Attempt all questions.(2x10=20)

1. Define an artificial intelligence (AI). Explain the behaviors of the AI. What do you mean by Turing Test? Explain it.
2. Why disjunctive normal form is required? Explain all the steps with examples.
3. "A person born in Nepal, each of whose parents is a Nepali citizen by birth, is a Nepali citizen by birth. A person born outside Nepal, one of whose parents is a Nepali citizen by birth, is a Nepali citizen by descent. Several developed countries have dual citizenship provision, but Nepal doesn't have that provision". Represent the above sentences in first-order logic and explain each step.
4. Differentiate between inference and reasoning. Why probabilistic reasoning is important in the AI? Explain with an example.
5. Justify that searching is one of the important part of AI. Explain in detail about depth first search and breadth first search techniques with an example.
6. Define learning. Why learning frame work is required? Explain about learning frame work with block diagram and examples.
7. What is a Bayes's theorem? Explain its applications.
8. What is a back propagation? Explain all the steps involved in the back propagation with an example.
9. How can you construct expert system? Explain knowledge engineering with a block diagram.
10. Define natural language processing. Explain the different issues involved in the natural language processing.

Year: 2068

Attempt all questions.(10x6=60)

1. What is Artifical Intelligence(AI)? Describe your own criteria for computer program to be considered intelligent.
2. For each of the following agents, determine what type of agent architecture is most appropriate (i.e. table lookup, simple reflex, goal-based or utility-based).
   a. Medical diagnosis system
   b. Satellite image analysis system
   c. Part-pricking robot
   d. Refinery controller
3. What is state space representation of problem? Represent the root finding problem having four cities in to state space representation (you can choose any ordering of cities and links) and devise the complete problem formulation.
4. What is heuristic information? Suppose that we run a greedy search algorithm with h(n)-g(n) and h(n)=g(n). what sort of search will the greedy search follow in each case?
5. State whether the following sentences are valid, unsatisfiable, or neither.
   a. Smoke => Smoke

b. Smoke => Fire
c. (Smoke => Fire) => (~Smoke => ~Fire)
d. Smoke V Fire V ~Fire

6. Consider the knowledge base:
   "If it is hot and humid, then it is raining. If it is humid, then it is hot. It is humid"
   a. Describe a set of propositional letters which can be used to represent the knowledge base.
   b. Translate the KB into propositional letters using your propositional letters from part a.
   c. Is it raining? Answer this question by using logical inference rules with the KB.
7. What do you mean by knowledge representation? Explain the characteristic of representatiion.
8. Define the Model-Based and Cased Based system. Discuss which system is suitable for the following problems.
   a. Electronic Circuit Testing
   b. Legal Reasoning
   c. Disease Recognition
9. What is Bayes' rule? Discuss the use of Bayes' rule for uncertain reasoning.
10. After your yearly checkup, the doctor has bad news and good news. The bad news is that you tested positive for a serious disease, and the test is 99% accurate (i.e. the probability of testing positive given that you have the disease is 0.99, as is the probability of testing negative if you don't have the disease). The good news is that this is a rare disease, striking only one in 10,000 people.
    a. Why is it good news that the disease is rare?
    b. What are the chances that you actually have the disease?

Third year/Five Semester

Subject : E-Governance CSC 307 **FM : 60**
Time : 3 hours **PM : 24**
Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.

Year: 2067

Long Answer Questions:

Attempt any two questions. (10x2=20)

1. What is E-Governance? Discuss critical flow model and comparative analysis model in detail.
2. Define the terms data warehousing and data mining. Discuss key areas that demand the use of data warehousing and data mining.
3. Discuss E-Governance initiatives taken by government of Nepal in present context.

Short Answer Questions:

Attempt any eight questions. (8x5=40)

1. Discuss the needs of E-Governance.
2. What are the issues related to E-Governance application? Why do we need to consider these issues?
3. How can we use E-Governance models to achieve good governance? Discuss.
4. What are different levels in maturity model?
5. Discuss human infrastructural preparedness for E-readiness.
6. What is technological infrastructural preparedness for E-readiness? Discuss.
7. How can we use data warehousing and data mining concepts in census data? Discuss.
8. What are the goals that data mining attempts to facilitate?
9. Discuss in brief about E-Governance in China.
10. Write short notes (any two):
    a. Cyber law
    b. G2C2G
    c. Digital divide

Year: 2068

Long Answer Questions:

Attempt any two questions. (10x2=20)

1. What is E-Governance? Discuss broadcasting and interactive-service models in detail.
2. Define the terms data warehousing and dta mining. Discuss the use of data warehousing and data mining in census and prices of essential commodities.
3. Explain the E-governance initiative taken by government of Nepal and also explain the challenges for this initiative.

Short Answer Questions:

Attempt any eight questions. (8x5=40)

4. Why do we neeed E-governance? Explain.
5. Discuss scope and content of E-governance.
6. Why cyber law is importance for Nepal? Explain.
7. Explain the characteristics of maturity levels.
8. Discuss legal infrasturctural preparedness for E-readiness.

9. What is institutional infrastructural preparedness for E-rediness? Discuss.
10. Discuss the use of data warehousing and data mining concepts in agriculture.
11. What is data warehouse? How does it differ from the database?
12. Explain in brief about E-governance initiatives in USA.
13. Write short notes: (Any Two)
    a. Global trends of growth in E-governance.
    b. Cyber law
    c. E-readiness

Third year/Five Semester

Subject : Design and Analysis of Algorithms CSC 303 **FM : 60**
Time : 3 hours **PM : 24**
Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.

Year: 2067

Long Answer Questions:

Attempt all questions.

1. Explain worst case, best case and average case of algorithm analysis with an example. (8)
2. What is recurrence relation? Find big-O of following recurrence using recurrence tree method. (2+6)

   $T(n)=T(n/2) + 1 \quad n>1$
   $=1 \quad n=1$
3. Make a tight big-O analysis of following code. (8)

```
Void main()
{
int m,n,i,j,a[],b[],c[];
printf("Enter value of m and n");
scanf("%d%d",&m,&n);
for(i=0;i<n;i++)
{
a[i]=i;
b[i]=i*i;
c[i]=-i;
}
for(j=0;j<m;j++)
{
printf("%d\t%d\t%d\n",a[j],b[j],c[j]);
}
}
```

4. What is order statistics? How can you devise an algorithm that guarantee the selection of ith order statistics in linear time? Write the algorithm of it and analyze it. (1+3+4)
5. What is the main idea of randomized algorithm? Write an algorithm quick sort and analyze it.
6. Define greedy paradigm. How can you define Huffman algorithm is greedy algorithm? Explain. (2+6)
7. What is minimum spanning tree? Write the execution trace of the following graph to construct minimum spanning tree by prime algorithm. (2+6)
   Fig……
8. Explain Graham's Scan algorithm to compute convex hull. (8)
9. Define the terms "Class P", "Class NP" and "NP-Completeness". (8)
10. What is the concept of dynamic programming? Find the longest common subsequence (LCS) between "XMJYAUZ" and "MZJAWXU". (2+6)

Year: 2068

Long Answer Questions:

Attempt all questions.

1. Write down the formal definition of big-oh, big-omega and big-thita notation with examples. (8)
2. What is recurrence relation? Find the big-O of following recurrence by using recurrence tree method (2+6)

   $T(n)=2T(n/2)+n \quad n>1$

   $=1 \quad n=1$
3. Make a tight big-O analysis of following code segment. (8)

```
Void main()
{
Int m,n,I,j,a[],b[];
Printf("Enter value of m and n");
Scanf("%d%d",&m,&n);
for(i=1,i<=m,i++)
a[i]=i*i;
for(j=1,j<=n;j++)
b[j]=-j;
for(i=1,i<=m,i++)
Printf("%d",a[i]);
For(j=1,j<=n;j++)
Printf("%d",b[j]);
}
```

4. What is linear data structure? Write down the algorithm of heap sort and find its complexity analysis. (2+6)
5. What is divide and conquer technique? Using this technique. Write an algorithm of quick sort then analyze it.
6. What are the advantages of dynamic programming? Find Longest Common Subsequence(LCS) between "abbaab" and "aabaabb". (2+6)
7. What is shortest path problem? Explain Dijkstra's algorithm for shortest path problem. (2+6)
8. What is left turn and right turn? Give an algorithm for finding two lines segments intersect or not by using left turn and right turn. Does this algorithm works for all cases? Justify with example. (2+6)
9. Define the terms "Class P", "Class NP" and "NP Completeness". (8)
10. What is the concept of randomized algorithm? Write an algorithm of approx-vertex-cover problem and analyze it. (2+6)

Third year/Five Semester

Subject : Cryptography CSC 303 **FM : 60**
Time : 3 hours **PM : 24**
Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.

Year: 2067

Attempt all questions:

1. Answer the following questions in short (any five). **(5x2=10)**
   a. List and briefly define types of cryptanalytic attacks based on what is known to the attacker.
   b. The larger the size of the key space, the more secures a cipher? Justify your answer.
   c. Explain the concepts of diffusion and confusion as used in DES.
   d. What are the characteristics of a stream cipher?
   e. How afraid should you be of viruses and worms?
   f. What do you mean when we say that a pseudorandom number generator is cryptographically secure?
   g. How many rounds are used in AES and what does the number of rounds depend on?
2. a. The notation Z_n stands for the set of residues. What does that mean? Why is Z_n not a finite field? Explain. (5)
   b. Find the multiplicative inverse of each nonzero element in Z_n. (5)

   OR

   Complete the following equalities for the numbers in GG(2): (5)
   1+1=?
   1-1=?
   -1=?
   1*1=?
   1*-1=?
3. a. What are the steps that go into the construction of the 16*16 S-box lookup table for AES algorithm? (5)
   b. In RSA algorithm, what is necessary condition that must be satisfied by the modulus n chosen for the generation of the public and private key pair? Also, is the modulus made public? (5)

   OR

   How is the sender authentication carried out in PGP? (5)
4. a. What sort of secure communication applications is the Kerberos protocol intended for? Explain.
   b. What is Fermat's Little Theorem? What is the totient of a number? (5)
5. a. Miller-Robin test for primality is based on the fact that there are only two numbers in Zp that when squared give us 1. What are those two numbers? (5)

   OR

   What is discrete logarithm and when can we define it for a set of numbers? (5)
   b. What is the Diffie-Hellman algorithm for exchanging a secret session key? (5)
6. a. We say that SSL/TLS is not really a single protocol, but a stack of protocols. Explain. What are the different protocols in the SSL\TLS stack? (5)
   a. What is the relationship between "hash" as in "hash code" or "hashing function" and "hash" as in a "hash table"? (5)

Year: 2068

Attempt all questions:

1. Answer the following questions in short (any five): **(5x2=10)**
   a. All classical ciphers are based on symmetric key encryption. What does that mean?
   b. What makes Vigenere cipher more secure than say, the Playfair cipher?
   c. AES is a block cipher. What sized blocks are used by AES?
   d. When does a set become a group?
   e. What is the difference between the notation a mod n and the notation a=b(mod n)?
   f. What is the difference3 between a virus and a worm?
   g. How do you define a prime number? When are two numbers A and B considered t be coprimes?

2. a. What do you mean by a "Feistel Structure for Block Ciphers"? Explain. (5)
   b. Divide $23x^2+4x+3$ by $5x + c$. assuming that the polynomials are over the field Z_7. (5)

   OR

   What are the asymmetries between the modulo n addition and modulo n multiplication over Z_n? (5)
3. a. Describe the "mix columns" transformation that constitutes the third step in each round of AES. (5)
   b. What is the difference between algorithmically generated random numbers and true random numbers? (5)
4. a. Miller-Rabin algorithm for primality testing is based on a special decomposition of odd numbers. What is that? Explain. (5)
   b. In RSA algorithm, the necessary condition for the encryption key e is that it be coprime to the totient of the modulus. But, in practice, what is e typically set to and why? (5)

5. a. What is meant by the strong collision resistance property of a hash function? (5)
   b. How can public-key cryptography be used for document authentication? (5)

6. a. What is the role of the SSL Record Protocol in SSL/TLS? Explain. (5)

   OR

   How many layers are in the TCP/IP protocol suite for internet communications? Name the layers. Name some of the protocols in each layer.
   b. What does PGP stand for? What is it used primarily for? And what are the five services provided by the PGP protocol?

Third year/Five Semester

Subject : Simulation and Modeling CSC 302 **FM : 60**
Time : 3 hours **PM : 24**

Year: 2067

Group 'A'
Long Answer Questions:

Attempt any two: (10x2=20)

1. What is model? What are the different types of models? Give example for each.
2. What do you mean by Queuing system? Explain the characteristics of Queuing system with example.
3. Explain the independence test. A sequence of 1000 four digit numbers has been generated and an analysis indicates the following combinations and frequencies.

Combination (i)	Observed frequency (Oi)
Four different digits	560
One pair	394
Two pairs	32
Three digits of a kind	13
Four digits of a kind	1
	1000

Based on poker test, test whether these numbers are independent. Use α=0.05 and N=4 is 9.49.

Group 'B'
Short Answer Questions:

Attempt any eight questions: (8x5=40)

4. What are the advantages and disadvantages of simulation?
5. What do you mean by Pseudo random numbers?
6. Explain non-uniform random number generation.
7. Define a Markov chains and its application.
8. Use the linear congruential method to generate a swquence of three two-digit random integers.
   Let X_0=29, a=9, c=49 and m=100
9. Why do we use verification and validation in simulation?
10. Explain the data and control statement in CSMP.
11. Explain the iterative process of calibrating a model.
12. Write short notes on:
    a. GPSS
    b. Server utilization

Year: 2068

Group 'A'
Long Answer Questions:

Attempt any two: (10x2=20)

1. Differentiate between dynamic physical models and static physical models with example.
2. Define the queuing system. Explain the elements of queuing system with example.
3. What is the main objective of gap test? Explain gap test algorithm with example.

Group 'B'

Short Answer Questions:

Attempt any eight questions: (8x5=40)

4. Differentiate between discrete and continuous system.
5. What do you mean by multi server queues?
6. What are the key features of Markov chains?
7. Explain the congruence method of generating random numbers.
8. What do you mean by calibration and validation of models?
9. What are the kendall notation of queuing system?
10. What do you mean by Hybrid Simulation?
11. Use the mixed congruential method to generate a sequence of three two digit random numbers with Xo=37, a=7,c=29 and m=100.
12. Explain GPSS with example.
13. Write short notes on:

a) Replication of Runs
b) Simulation tools

Third year/Five Semester

Subject : Wireless Networking CSc-308 **FM : 60**
Time : 3 hours **PM : 24**

Year: 2067

Attempt any all (10x6=60)

1. Define wireless communication. Compare first and second generation cellular system.
2. A GSM system operating at 900 MHz needs a receiver sensitivity of -50dBm at a distance of 500m from the transmitter. Transmitting antenna gain and receiving antenna gain are 10dB and 8dB respectively. At what power level the signal should not be transmitted to satisfy the above the condition? Use free space path loss model.
3. Define modulation. Explain minimum shift key (MSK) modulation technique.
4. Why diversity is used in wireless communication? Explain different diversity mechanism.
5. Define co-channel cell. Find the distance between the nearest co-channel cell in hexagonal topology with necessary diagram.
6. Define adjacent channel interference. Explain how adjacent channel interference can be reduced.
7. Explain frequency division multiple access technique.
8. Define handoff. Explain briefly about different handoff strategies.
9. Write briefly on operation of mobile IP.
10. Write short notes on(any two):
    a. Near-far effect
    b. OFDM
    c. Aloha
    d. Mobile TCp hierarchy

CSIT Questions Collections 2068

Third Year/ Six Semester

Third Year/Six Semester

Subject : Compiler Design and Construction **FM : 60**
Time : 3 hours **PM : 24**

Candidates are required to give their answer in their own words as for as practicable.
Attempt all the questions.
Every question contains equal marks.

Year: 2068

1. What do mean by compiler? How source program analyzed? Explain in brief.
2. Discuss the role of symbol table in compiler design.
3. Convert the regular expression '0+ (1+0)*00' first into NFA and then into DFA using Thomson's and Subset Construction methods.
4. Consider the grammar:
   S->(L)| a
   L->L, S|S
5. Consider the grammar
   C→AB
   A →a
   B→ a
   Calculate the canonical LR (0) items.
6. Describe the inherited and synthesized attributes of grammar using an example.
7. Write the type expressions for the following types.
   a. An array of pointers to reals, where the array index range from 1 to 100.
   b. Function whose domains are function from characters and whose range is a pointer of integer.
8. What do you mean by intermediate code? Explain the role of intermediate code in compiler design.
9. What is operation of simple code generator? Explain.
10. Why optimization is often required in the code generated by simple code generator? Explain the unreachable code optimization.

Third Year/Six Semester

Subject : Web Technology **FM : 80**
Time : 3 hours **PM : 32**

Year: 2068

Section A

Attempt any two questions (2x12=24)

1. How does a web server link physically on the Internet? How do we navigate from one URL to another from a page displayed at a browser? Explain.
2. List the protocols and their use at the application layer in the Internet. Why World Wide Web is use? Explain.
3. What is Dom Hierarchy? Explain the use of *,? and t in defining a Dom element.

Section B

Attempt any two questions (8x7=56)

1. What are the tags and the attributes for a table in HTML document?
2. Write short notes on various services offered by the Internet.
3. What is the functionality and purpose of HTTP?
4. Explain the XML syntax and structure rules.
5. Mention the application of XSL.
6. What are the benefits and draw backs of using XML name space?
7. What is the syntax of declaring an attribute in a DTD?
8. Explain briefly, how the domain names are translated to IP addresses?
9. Explain the client/server concepts of web?
10. What do you mean by cookies? Explain with example.

Third Year/Six Semester

Subject : Software Engineering **FM : 60**
Time : 3 hours **PM : 24**

Year: 2068

Attempt any ten questions (10x6=60)

1. Differentiate between software process and software process model.
2. What are the key challenges facing in software Engineering? Explain.
3. Explain the system design process.
4. Why program are developed using evolutionary development are likely to be difficult to maintain? Explain.
5. What is the critical distinction between a milestone and deliverable? Explain.
6. Why elicitation and analysis is a difficult process in requirement engineering process? Explain.
7. Explain the rapid prototyping techniques with example.
8. Explain the control models and its types.
9. Explain the use case diagram with example.
10. Explain the verification and validation planning.
11. Write short notes on(any two):
    a) Data flow models
    b) COCOMO model
    c) Security assessment
12. Short notes on
    a) Data flow models
    b) COCOMO model
    c) Security assessment.

Third Year/Six Semester

Subject : Real Time System **FM : 80**
Time : 3 hours **PM : 32**

Year: 2068

Section A

Attempt any two questions (2x12=24)

1. Explain the various components of a real time system with suitable block diagram. State and prove the optimal Earliest-Deadline-First (EDF) algorithms.
2. Explain the multiprocessor priority ceiling protocol with suitable example.
3. Explain the Slack Stealing in deadline-driven system with example.

Section B

Attempt any eight questions (8x7=56)

1. Explain the real-time command and control system with suitable example.
2. What is hard real time system? Explain with example.
3. Differentiate between data dependency and temporal dependency.
4. State and prove the Optimal Least-Slack-time-first (LST) algorithm.
5. Define the clock-driven scheduling. What are the advantages and disadvantages of it?
6. Differentiate between fixed priority algorithm and dynamic-priority algorithm.
7. Explain the sporadic server in fixed system with example.
8. What is rate monotonic algorithm? Explain with suitable example.
9. Explain the priority based service disciplines for switched networks.
10. Write short notes on :
    a. Scheduling hierarchy
    b. Communication in multicomputer system

Third Year/Six Semester

Subject : Ecommerce **FM : 60**
Time : 3 hours **PM : 24**

Year: 2068

Attempt all questions

Section A (10x3=30)

1. Explain the various categories of e-commerce. Define the role of e-commerce in business, device, learning and community.
2. Explain the B2B commerce and its advantages and disadvantages.
3. Explain the various features and advantages of electronic payment system. What are the problems in implementation? Explain.

Section B (6x5=30)

4. Compare between traditional and electronic commerce.
5. Explain the components of the Information superhighway infrastructure.
6. Define the firewall and its types.
7. Explain the Mercantile process models from Merchant's perspective.
8. Explain the cryptography and its types.
9. Write short notes on (**any two**):
   a. Digital signature
   b. Secure socket layer
   c. EDI

Third Year/Six Semester

Subject : Web Centric **FM : 60**
Time : 3 hours **PM : 24**

Year: 2068

Attempt all questions

1. Write short note on: (5X2=10)
   a. Pack/unpack functions
   b. Use and require
   c. Die in Perl
   d. Flock and fork functions
   e. System V IPC
2. a. Write is a file handle? How they are similar to streams? (2+3)
   b. What are the scalar variables? Discuss various types of variables used in Perl with examples. [1+4]
3. a. Write a Perl program that asks the user to enter a name and prints the name in reverse order.
   b. How we do loop control with next, last and redo? Where we should use them and where not?
4. a. Write a Perl program which takes file name as arguments and counts lines in file with string "at".
   b. What are subroutines? Explain with example how parameters are passed by value and by reference in subroutines.
5. a. Write a Perl script which compares and concatenates two strings. [5]
   b. What are hashes? Describealll functions relevant to hashes.
6. a. Write a program for TCP/IP socket connection between Server and client. [5]
   b. Write a CGI script to saver a form in a file or mail pipe. [5]

Third Year/Six Semester

Subject : Net Centric Computing **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: 2068

1. Answer the following question in short. (5x2=10)
   a) Web services
   b) HTTP protocol
   c) COM
   d) CSS
   e) The GLOBAL.ASA file
2. a) Differentiate between request and response object with example. (5)
   b) Differentiate between database access component (i.e.ADO) and file access component with sample code. (5)
3. Write a program for entering employee basic information in one ASP page and display it another. (5)
4. a) What do you mean by connection? Illustrate record set with example for deleting data record from the database. (5)
   b) Explain the steps required for designing an ASP based application. List different applications of ASP. (4+1)
5. a) Explain Microsoft .NET framework and its components. (5)
   b) Differentiate between ASP.NET and classical ASP. Explain the structure of general ASP page. (1+4)
6. a) What are input validation controls? How do they help in .NET framework? Explain with example. (1+1+3)
   b) Explain exception with suitable example in C# programming. (5)

Third Year/Six Semester

Subject : Image Processing **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: 2068

1. Explain the digital image processing with example. (6)
2. Define the fourier transform. Explain the Hadamard transform with example. (2+4)
3. What do you mean by visual perception? What are the elements of visual perception ? Explain. (3+3)
4. Explain the template matching with algorithm and example. (6)
5. What is image coding? Explain the Run length coding with example. (2+4)
6. Mention the different types of character recognition and explain it. (6)
7. What is pattern recognition? Explain the applications of neural networks in pattern recognition. (2+4)
8. Define the edge detection. What do you mean by template matching? Explain. (2+4)
9. How dilation and erosion are applied in region filling and boundary extraction? Explain. (6)
10. Write short notes on: (3+3)
    a. Features extraction
    b. Wavelet transform
11. Differentiate between: (3+3)
    a. High pass and band pass filtering
    b. Line detection and edge detection

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Preface

We are pleased to present the first "Old Questions Collection of B.Sc. (CSIT) of Tribhuvan University among the student's of Bachelor Level. We have tried our best to maintain the originality regarding the questions that appeared during the exam. We hope this will meet the needs of student's and teachers. We would like to express our sincere thanks to Rajan Adhikari, Prakash Bhusal, Sajjan Lamichane, Mukesh Chaudhary, V.K. Pandey, Subash Paudyal and Ashish Shrestha for their co-ordination.

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We look forward to hearing comments & suggestions from the users of our books. Constructive suggestions will be gladly appreciated and incorporated in future edition.

Rgds,
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