Course Title: Introduction to Digital Electronics   Course No: CSE 200
Total Marks: 60   Time: 3 (three) Hours

N.B.
i) Answer SIX questions taking any THREE from each Section
ii) All questions are of equal values.
iii) Use separate answer script for each section

Section-A

1. a) Digital system works with discrete values-explain it.   2

   b) Do the subtraction using 10's complement: 4
     i) $(11001)_2 - (10001)_2$
     ii) $(10001)_2 - (11001)_2$

   c) Explain the postulates with proper example with respect to Boolean algebra.   4

2. a) How can full adder be realized using two half adders.   3

   b) Minimize the functions and realize using minimum number of gates.   4
     $F = \sum m(0, 1, 2, 3, 11, 12, 14, 15)$

   c) Write the truth table of an Ex-OR function and realize this using only NAND gates.   3

3. a) Using Boolean algebra, simplify each expressions: 5
     i. $BD + B(D+E) + \overline{D}(D+F)\overline{B}\ \overline{C}$
     ii. $\overline{A}\ \overline{B}C + \overline{(A+B+\overline{C})} + \overline{A}\ \overline{B}\ \overline{C}\ D$

   b) Convert the following expression to Sum-of-Product (SOP) form: 5
     i. $(A+\overline{BC})\ C$
     ii. $(A+C)(AB+AC)$

4. a) Draw and explain binary full adder.   3

   b) Explain tri-state logic.   3

   c) How many 74AS00 NAND gate input can be driven by a 74ALS00 NAND gate output? Here $I_{IH}, I_{IL}(max) = 8mA$, I_{OH} and $I_{OL}(max) = 0.1\ mA$.   4

Section-B

5. a) Give the classification of logic families.   3

   b) Define $V_{IH}(min)$, $V_{IL}(max)$, $V_{OH}(min)$ and $V_{OL}(max)$ with proper example.   3

   c) Define I_{IH}, I_{IL}, I_{OH} and I_{OL} with proper example.   4

6. a) Describe the following terms with proper examples: Fan out, Power dissipation, Propagation delay, Noise margin, Fan in, Operating temperature and Power supply requirements.   4

   b) What is high threshold logic?   3

   c) Write down the characteristics of 74LS series.   3

7. a) Describe Open collector output, Totem-pole output and Tri-state output with proper example.   4

   b) State advantages and disadvantages of TTL.   4

   c) What is 14000 series?   2

8. a) What do you mean by Multi-vibrator? Explain astable Multi-vibrator.   4

   b) Explain TTL driving CMOS circuit.   3

   c) Explain CMOS tri-state logic.   3

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. Engineering Examination-2016

Course Title: Economics
Course No: ECO 204

Total Marks: 60
Time: 3 (three) Hours

N.B.
i) Answer SIX questions taking any THREE from each Section
ii) All questions are of equal values.
iii) Use separate answer script for each section

Section-A

1. a) Define 'Economics'. How can you differentiate microeconomics from macroeconomics? 5
    b) What are the subject matters of economics? Explain. 5

2. a) Illustrate the types of price elasticity of supply. 5
    b) Suppose the income of a person is Tk. 50000 per month and he purchases twelve CDs per month. Let us assume that the monthly income of the consumer increase 20% and the quantity demanded of CDs per month rises to fourteen. Calculate the elasticity of demand for CDs. 5

3. a) Explain the law of diminishing marginal utility with assumptions. 6
    b) Derive a demand curve with a single commodity. 4

4. a) What is production? Discuss the factors of production. 4
    b) Explain the three stage of production function. Which stage is zone of rational action? Why? 6

Section-B

5. a) Define multiplier with example. 3
    b) Let us suppose in an economy the marginal propensity to consume is 0.75 and the level of autonomous investment decreases by 50 millions. Find out the change in the equilibrium level of income and consumption expenditures and explain the answer. 5
    c) What is business cycle? 2

6. a) Distinguish between GDP and GNP. 4

   b) Show circular flow of national income in a simple two-sector economy. 6

7. a) What do you mean by inflation, deflation, disinflation, and hyperinflation? 4

   b) Graphically explain the demand pull inflation and supply shock inflation. 6

8. a) What factors determine the volume of exports in an economy? 2

   b) Suppose in an economy the consumption = 260 + 0.8 Yd, Investment = 300, Tax = 8
   300, Government Expenditure = 300, Exports = 300 – 0.05Y. Find the equilibrium
   level of income, the net exports at equilibrium level of income, the equilibrium level
   of income and the net exports when there is 10% increase in investment, the
   equilibrium level of income and the net exports when the net export function becomes
   280 – 0.05Y.

Course Title: Theory of Statistics   Course No: STA 204
Total Marks: 60   Time: 3 (three) Hours

N.B.
i) Answer SIX questions taking any THREE from each Section
ii) All questions are of equal values.
iii) Use separate answer script for each section
iv) Symbols represent their usual meaning

Section-A

1. a) Show that if X_i, (i=1,2,.....,n) are independent $N(0, \sigma^2)$ and they are transformed to a new set of variables Y_i, (i=1,2,.....,n), by means of a linear orthogonal transformation, then Y_i, (i=1,2,.....,n) are also independent $N(0, \sigma^2)$.   5

   b) Define chi-square statistic and chi-square distribution. Show that chi-square distribution is a special case of gamma distribution.   5

2. a) Prove that the mean of chi-square distribution is equal to the half of its variance.   5

   b) State and prove Fisher's Lemma.   5

3. a) What are the properties of χ^2 distribution?   2

   b) Define point estimation with example. What are the properties of a good estimator?   3

   c) What do you mean by unbiasedness? Let $x_1, x_2,.....,x_n$ be a random sample of size n drawn from the Bernoulli distribution with parameter θ. Show that $\frac{T(T-1)}{n(n-1)}$ is an unbiased estimator of θ_2, where $T=\sum_{i=1}^{n} x_i$.   5

4. a) Let $x_1, x_2,....., x_n$ be a random sample of size n drawn from the density function $f(x: \mu, \sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2\sigma^2}(x-\sigma)^2}$; $-\alpha < x < \alpha$. Find the maximum likelihood estimator of μ and σ^2.   5

   b) Establish the relationship between t and F distribution.   5

Section-B

5. a) Define the following terms: (i) Null hypothesis and Alternative hypothesis, (ii) Acceptance region and Rejection region, (iii) Type I error and Type II error.   6

   b) What do you mean by statistical hypothesis? Write down the general procedure of hypothesis testing.   4

6. a) What are the uses of normal test? Give the decision rule table of normal test. 5

   b) Two researchers adopted different sampling techniques while investigating the same group of students to find the number of students falling in different intelligence levels. The results are as follows: 5

Researchers	No. of students in each level				Total
	Below Average	Average	Above Average	Genius	
X	86	60	44	10	200
Y	40	33	25	2	100
Total	126	93	69	12	300

   Would you say that the sampling techniques adopted by the two researchers are significantly different? (Given that 5% value of χ^2 for 2 d.f and 3 d.f are 5.991 and 7.82 respectively.)

7. a) Write down the procedure of testing the equality of two variables. 4

   b) Manager of a fertilizer factory claims that the average daily production of his factory follows normal distribution with mean production 880 kg. A random sample of 50 days shows that average production is 871 kg with standard deviation 21 kg. Test the significance of the claim of the manager at 5% level of significance. 3

   c) Suppose the daily numbers of items produced by a firm for randomly selected 15 days are as follows: 110, 118, 130, 140, 142, 146, 112, 100, 95, 98, 96, 122, 123, 124, and 130. Can we conclude at 5% level of significance that the average daily production of items of that firm is 110? 3

8. a) What are the assumptions of chi-square test? When Yates correction is appropriate to use? 3

   b) Distinguish between parametric test and non- parametric test. 3

   c) A certain drug is claimed to be effective in curing cold. In an experiment on 500 persons suffering from cold, half of them were given the drug and half of them were given the sugar pills. The reaction to the treatment on patients are recorded as in the following table: 4

	Helped	Harmed
Drug	150	100
Sugar pills	130	120

   On the basis of the information can it be concluded that there is a significance difference in the effect of the drug and sugar pills. [$\chi^2_{0.05,1}= 3.84$]

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. Engineering Examination-2016
Course Title: Matrices and Differential Equations   Course No: MAT 204
Total Marks: 60   Time: 3 (three) Hours

N.B.
i) Answer SIX questions taking any THREE from each Section
ii) All questions are of equal values.
iii) Use separate answer script for each section

Section-A

1. a) Define with example: (i) Symmetric matrix, (ii) Orthogonal matrix, (iii) Unitary matrix, (iv) Diagonal matrix and (v) Singular matrix.   5

   b) Solve the following equations by matrix method: 5
   $$x + 2y + 3z = 4, \quad 2x + 3y + 8z = 7, \quad x - y + 9z = 1$$

2. a) Explain the following term the adjoin of a square matrix. Find the inverse of the following matrix: 5
   $$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

   b) Define rank of a matrix. Find the rank of the matrix   5
   $$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 8 \\ 4 & 10 & 18 \end{bmatrix}$$

3. a) Define eigen values and eigen vectors.   4

   b) Find the eigen values and eigen vectors of the following matrix: 6
   $$A = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$$

4. a) Verify Cayley-Hamilton theorem for the matrix   5
   $$A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

   b) Prove that if A is an $n \times n$ triangular matrix, then the elements of the principal diagonals are the characteristic roots of A.   5

Page 1 of 2

Section-B

5. a) Write down the conditions for an equation to be non-linear differential equation with examples. 4

   b) Solve the initial value problem $\frac{dy}{dx} + \frac{y}{2x} = \frac{x}{y3}$ with $y(1) = 2$. 6

6. a) What do you mean by Bernoulli's differential equation? State and prove the necessary condition for a differential equation of first degree being exact. 5

   b) Solve the ordinary differential equation: 5
   $$(2xy + 1)dx + (x^2 + 4y)dy = 0$$

7. a) Solve the equation: 5
   $$x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$$

   b) The population of a city satisfies the differential equation: 5
   $$\frac{dx}{dt} = \frac{1}{100}x - \frac{1}{10^8}x^2$$

   Where t is measured in years. Find the population of the city at 2000. Where the population of the city on 1980 was 10^5.

8. a) Solve the equation: $xyp^2 + (x^2 + xy + y^2)p + x^2 + xy = 0$ 5

   b) Solve the differential equation operationally: 5
   $$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{2x}$$

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Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. Engineering Examination-2016
Course Title: Object-Oriented Programming   Course No: CSE 202
Total Marks: 60   Time: 3 (three) Hours

N.B.
i) Answer **SIX** questions taking any **THREE** from each Section
ii) All questions are of equal values.
iii) Use separate answer script for each section

Section-A

1. a) What is object-oriented programming? How is it different from the procedure-oriented   2
      programming?
   b) What are the advantages of using new operator as compared to the function malloc()?   2
   c) Write a C++ program that finds the largest number out of given two numbers. You   6
      have to use nested member functions.

2. a) What are the relationship between class and object? Explain with an example.   4
   b) Write a C++ program for defining a class to represent a bank account. Include the   6
      following members:
      Data members:
          i.   Name of the depositor
          ii.   Account number
          iii. Type of account
          iv.   Balance amount in the account
      Member functions:
          i.   To assign initial values
          ii.   To deposit an amount
          iii. To withdraw an amount after checking the balance
          iv.   To display name and balance

3. a) Describe the mechanism of accessing data members and member functions in the   6
      following cases:
          (i)   Inside the main program.
          (ii) Inside a member function of the same class.
          (iii) Inside a member function of another class.
   b) What is a class and data hiding? How does a class accomplish data hiding? Explain   4
      with appropriate diagram.

4. a) Explain the following concepts with examples.   3
          (i)   Encapsulation
          (ii) Polymorphism
          (iii) Inheritance

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b) Write a C++ program that implements the multilevel inheritance. 4

c) When will you make a function inline? Why? 3

Section-B

5. a) What are constructor and destructor? Why are they used? 3

   b) How do we invoke a constructor function? Explain with examples. 3

   c) Write a C++ program with parameterized constructors. 4

6. a) Why is virtual function used in C++? What do you mean by compile time and run time polymorphism? 4

   b) We know that a private member of a base class is not inheritable. Is it anyway possible for the objects of derived class to access the private member of the base class? If yes, how? Explain with C++ program. Remember, the base class cannot be modified. 5

   c) What is an abstract class? 1

7. a) What is a friend function? Why is friend function used? 3

   b) Write a C++ program to represent a vector (a series of integer values). Include member functions to perform the following tasks: 5
      (i)   To create the vector
      (ii)   To modify the vector
      (iii) To multiply by a scalar value
      (iv)   To display the vector in the form (10, 20, 30, ...)

   c) What do you mean by dynamic initialization of a variable? Give an example. 2

8. a) What are the applications of this pointer? 3

   b) What is exception? Describe the exception handling mechanism. 3

   c) How can we open a file? Write a C++ program for opening a file. 4

Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. Engineering Examination-2016

Course Title: Industrial Management and Accountancy   Course No: ACC 204

Total Marks: 60   Time: 3 (three) Hours

N.B.
i) Answer SIX questions taking any THREE from each Section
ii) All questions are of equal values.
iii) Use separate answer script for each section

Section-A

1. a) Define industry. Discuss different types of industry in brief.   5
    b) What do you mean by business? Discuss different types of business in brief.   5

2. a) Define sole proprietorship business. State its features. What are the disadvantages of sole proprietorship business?   5
    b) Why sole proprietorship business is more popular than the other forms of business?   5

3. a) What do you mean by management?   2
    b) What are the principles of management according to Henry Fayol?   4
    c) Explain the functions of management.   4

4. a) Why does accounting so popular now a days? Explain.   3
    b) Briefly explain the history of accounting.   3
    c) What do you mean by joint stock company? State its classification.   4

Section-B

5. a) What do you mean by accounting? What are the interested parties of accounting information?   5
    b) State the basic accounting equation. Briefly explain the terms assets, liabilities and owner's equity.   5

6. a) What are the features of business transaction?   2
    b) Sumaiya travel agency established on April 1, 2016. The following transactions were completed during the month.   8
    - i. Started the business with cash TK. 15,000
    - ii. Paid office rent cash TK. 600
    - iii. Purchased office equipment for TK. 3,000 cash
    - iv. Incurred TK. 700 of advertisement costs in daily star.
    - v. Paid TK. 800 cash for supplies.

Page 1 of 2

vi. Earned TK. 11.000 for service rendered: TK. 3,000 cash received & the balance of TK. 8,000 is billed to customers on account.

vii. Withdraw for personal use TK. 500

viii. Paid daily star amount due in transaction (iv)

ix. Paid employees salaries TK. 2,200

x. Received TK. 4.000 in cash from customers who have previously been billed in transaction(vi)

Prepare a tabular analysis of transactions using the following column heading: cash, account receivable, supplies, office equipment, accounts payable, and Sumaiya's capital.

7. a) What is journal? Discuss golden rule of accounting.   3

b) Shakila traders started its business with TK. 20,000, office equipment TK. 50,000 &   7
motor car TK. 30,000 on march 1, 2016.
March 3, 2016: Bought goods for cash from Rana TK. 10,000
March 4, 2016: Sold furniture TK. 5,000
March 5, 2016: Deposited into bank TK. 3,000
March 9, 2016: Depreciation 10% on furniture TK. 50,000 & building TK. 35,000
March 19, 2016: Collected account receivable TK. 5,000
March 25,2016: Salary TK. 3,000, Rent TK. 2,000, Utility bill TK. 1,000
Journalize the above transactions.

8. a) Is a trial balance part of accounts?   2

b) Prepare a trial balance of Mukta traders Ltd for the year ended December 31, 2015   8
from the following information:

	Particulars	Taka		Particulars	Taka
1.	Capital	22,500	17.	Commission expense	1,000
2.	Purchase	15,000	18.	Discount received	500
3.	Account receivable	8,000	19.	Rent expense	1,000
4.	Account payable	7,000	20.	Repairing expense	1,000
5.	Building	10,000	21.	Drawings	2,000
6.	Machineries	6,000	22.	Travelling expense	1,300
7.	Bills receivable	9,000	23.	Interest on investment	1,000
8.	Bills payable	13,000			
9.	Sales	27,000	24.	Sales return	500
10.	Rates & taxes expense	500	25.	Purchase return	1,000
11.	Discount expense	400	26.	Band overdraft	10.000
12.	Inventory(01.01.2015)	7,000	27.	Good will	5,000
13.	Salaries expense	5,000	28.	Cash in hand	5,000
14.	Wages expense	4,400	29.	Depreciation	500
15.	Bad debts expense	700	30.	Advertisement expense	700
16.	Provision for doubtful debts	2,000			