Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. Engineering Examination-2015

Course No: CSE 200 Course Title: Introduction to Digital Electronics
Full Marks: 70 Time: 3 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

Q.1 (a) What are digital and analog systems? What are the advantages and disadvantages of digital techniques? 4
(b) What do you mean by universal gate why it is called universal gate? Prove that NOR gate is universal gate. 5
(c) Define byte, nibble and word? 2.67

Q.2 (a) Using Demorgan's theorem prove that $\overline{x.y.z} = \bar{x} + \bar{y} + \bar{z}$ 3
(b) Minimize the functions and realized using minimum number of gates $f = \sum m(0,1,2,3,11,12,14,15)$ 5
(c) What do you know by sum of products and product of sums? 2
(d) Convert 317_{10} to hex, then from hex to binary. 1.67

Q.3 (a) What is the largest BCD encoded decimal value that can be represented in three bytes? 2
(b) Simplifying the expressions i. $z = AB + \overline{(AC)} + A\bar{B}C(AB + C)$ 6
ii. $x = (M + N)(\bar{M} + P)(\bar{N} + \bar{P})$
(c) Show how $x = AB\bar{C}$ can be implemented with one two input NOR and one two input NAND gate. 3.67

Q.4 (a) Draw the circuit $z = ABC + A\bar{B}(\overline{AC})$ and then draw the simplify circuit. 5
(b) Design a simplify logic circuit that has three inputs, A, B and C, and whose output will be HIGH only when a majority of the inputs are LOW. 5
(c) What do you understand by don't care conditions? 1.67

SECTION-B

Q.5 (a) Given the two binary numbers X = 1010100 and Y = 1000011, perform the subtraction using 2's complements method. 4
(b) State advantages and disadvantages of TTL. 5
(c) What are the basic steps in fixing a digital circuit faults? 2.67

Q.6 (a) How call full adder be realized using two half adders? 4
(b) Describe the following term with proper example Fan Out, Power Dissipation, Propagation Delay, Noise Margin, Fan In, Operating temperature and Power supply requirements. 5
(c). Design a adder for 1-bit numbers? 2.67

Q.7 (a) What do you understand by darlington Transistor? Draw the figure of darlington transistor. 3
(b) What is a transistor? Discuss different kinds of BJT transistors. 4
(c) Explain TTL Driving CMOS circuit. 4.67

Q.8 (a) What do you understand by current sinking action and current sourcing action? 3
(b) Discuss the operation of CMOS NAND and CMOS NOR gates with appropriate figure. 6
(c) What is tristate? What are the advantages of tristate? 2.67

Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science and Engineering

2nd Year 1st Semester B.Sc. Engineering Examination-2015

Course No: ECO 204 Course Title: Economics

Total marks: 70 Time: 3 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. Distinguish between Micro and Macro economics.	5
	(b)	Discuss the three basic questions faced by every economic agent in an economy.	$6\frac{2}{3}$
2.	(a)	What is law of supply?	2
	(b)	Draw a supply curve assuming a hypothetical supply schedule.	4
	(c)	Geographically show the shift of supply curve.	$5\frac{2}{3}$
3.	(a)	What is production?	$2\frac{2}{3}$
	(b)	Discuss the relative importance of factors of production.	5
	(c)	Discuss total cost and average cost with diagram	4
4.	(a)	Define monopoly. What are the features of monopoly?	$5\frac{2}{3}$
	(b)	Explain the equilibrium under monopoly.	6

SECTION-B

5.	(a)	What do you mean by input-output model?	4
	(b)	Explain the input-output model to show the equilibrium of an economy.	$7\frac{2}{3}$
6.	(a)	Define inflation and explain the classification of inflation.	7
	(b)	Describe the circular flow of income in a two-sector economy with household and business firms.	$4\frac{2}{3}$
7.	(a)	Describe the methods of national income accounting. Which method is suitable for Bangladesh? Give your opinion.	$7\frac{2}{3}$
	(b)	How can you avoid double counting problem?	4
8.	(a)	What is economic planning?	$3\frac{2}{3}$
	(b)	How many planning are taken by Bangladesh? What are those?	3
	(c)	What are the aims and objectives of the 6th Five Year Plan of Bangladesh?	5

Bangabandhu Sheikh Mujibur Rahman Science & Technology University
Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. (Eng.) Examination 2015
Course No.: MAT 204 Course Title: Matrices and Differential Equations
Full Marks: 70 Time: 04 Hours

N.B. 1) The Figures in the right margin indicate full marks.
2) Answer any **Three** from the each of the section of the following questions.

Section-A

1. **a.** Define Symmetric matrix, Hermitian and Involutory matrix with examples. Show that the matrix $A = \begin{bmatrix} -1 & 3 & 5 \\ 1 & -3 & -5 \\ -1 & 3 & 5 \end{bmatrix}$ is an idempotent matrix. **6.67**

b. Solve the following system of linear equations by using matrices: **5**

$$x - y + z = 1$$
$$x + y - 2z = 0$$
$$2x - y - z = 0$$

2. **a.** Define consistent and inconsistent system of linear equation. Show that the following system of linear equation is inconsistent: **5.67**

$$2x + 3y + 5z + t = 3$$
$$3x + 4y + 2z + 3t = -2$$
$$x + 2y + 8z - t = 8$$
$$7x + 9y + z + 8t = 0$$

b. Define rank of a matrix. Find the rank of the following matrix: $A = \begin{bmatrix} -1 & 2 & 3 & -2 \\ 2 & -5 & 1 & 2 \\ 3 & -8 & 5 & 2 \\ 5 & -12 & -1 & 6 \end{bmatrix}$ **6**

3. **a.** Define eigenvalues and eigenvectors. **3**

b. Find the eigenvalues and eigenvectors of the following matrix: **8.67**

$$A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

and also find the matrix P that diagonalizes the matrix A and find $P^{-1}AP$.

4. **a.** State Cayley-Hamilton. Find the characteristic equation of the matrix **7**

$$A = \begin{bmatrix} -4 & 5 & 5 \\ -5 & 6 & 5 \\ -5 & 5 & 6 \end{bmatrix}$$

and verify Cayley-Hamilton theorem for it and also find the inverse of the matrix A by using Cayley-Hamilton.

b. Prove that any square matrix A and its transpose A^T have the same eigenvalues. **4.67**

Section-B

5. **a.** What do you mean by ordinary and partial differential equations. Find the differential equation of the family of curves $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, where a and b are arbitrary constant and identify it. **4.67**

   b. Solve the following initial value problem **4**
   $x\sin y\,dx + (x^2+1)\cos y\,dy = 0$; with initial condition $y(1)=\Pi/2$.

   c. Define Bernoulli's equation. Solve the differential equation: $\frac{dy}{dx} + y = xy^3$. **3**

6. **a.** Define integrating factor with examples. Solve the differential equation: **3.67**

$$(x^2 + y^2 + 2x)dx + 2ydy = 0$$

   b. Solve **any two** of the following differential equations: **4+4**

   i) $(D^3 - D^2 - 6D)y = x^2 + 1$
   ii) $(D^2 - 5D + 6)y = x^2e^{3x}$
   iii) $(D^2 + 3D + 2)y = e^{2x}\sin x$

7 **a.** Solve the differential equation $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = 4\ln x$ **3.67**

   b. Find the complete integral of $2zx + pq = px^2 + 2qxy$ **4**

   c. Find the complete integral of $2p_1x_1x_3 + 3p_2x_3^2 + p_2^2p_3 = 0$ **4**

8. **a.** Solve the differential equation: $z(x+y)p + z(x-y)q = x^2 + y^2$ **3.67**

   b. Solve **any two** of the following differential equations: **4+4**

   i. $\left(D^2 - 2DD' + D'^2\right)z = e^{x+2y} + x^3$
   ii. $\left(D^2+D'^2\right)z = \cos mx.\cos nx$
   iii. $(D - 3D' - 2)^2 z = 2e^{2x}\sin(3x + y)$

2nd Year 1st Semester B.Sc. Engineering Examination-2015

Full Marks: 70 ACC204:Industrial Management and Accountancy **Time: 3 Hours**

1860

[Answer any **Six** questions. Any **Three** from each section]

SECTION-A

1. a) Define Business. What are the functions of Business? 6
   b) "Commerce Removes all the Hindrance of a Business" Do you Support it? Why $5^{2}/_{3}$

2. a) Define Partnership Business According to Partnership Act, 1932 with its Characteristics 6
   b) Do you support that there are some basic differences between Partnership Business and Joint Hindu Family Business? If yes, What are the differences? $5^{2}/_{3}$

3. a) What do you mean by Entrepreneur? What are the qualities of a successful Entrepreneur? $6^{2}/_{3}$
   b) If you are asked to select a suitable location for a business organization, what factors will you consider? 5

4. The following transactions occurred of a Repair Shop on December 2014. $11^{2}/_{3}$

   1. Invested Tk. 100000 cash to start the business.
   2. Purchased of equipment for Tk. 28000.
   3. Provided services on cash of Tk. 50000 to the customers.
   4. Paid Tk. 12000 for December office rent.
   5. Received Tk. 15000 from customers but services has not been provided.
   6. Purchased supplies on account Tk. 22000.
   7. Withdrew Tk. 11500 for personal use.
   8. Paid Utility bills of Tk. 1500.
   9. Paid the total amount of supplies purchased on transaction (no.6).
   10. Service has been provided but not billed at Tk. 5000.

   Now you are requested to prepare a **Tabular Analysis** of the transactions, using the following column headings: **Cash, Accounts Receivable, Equipment, Supplies, Accounts Payable, and Owners Equity.**

SECTION-B

5. **Mr. Masum** Started a business with investing Tk. 300000 on **January 1**, 2015. Other transactions at the month are listed below: $11^{2}/_{3}$

   January 3, Purchased of goods Tk. 55000 from Mr. Rahim where Tk. 35000 has been paid in cash.
   January 7, Sold of Goods Tk. 200000 in cash.
   January 10, purchased equipment of Tk. 30000.
   January 15, Paid employee salaries for Tk. 25000
   January 17, Incurred Advertising expenses in Tk. 15000 on account.
   January 20, Received Tk. 35000 from ABC limited but services has not been provided.
   January 23, Mr. Masum withdraws Tk. 15000 for personal use.
   January 25, Paid Tk. 20000 to Mr. Rahim.
   January 30, Paid the bill of transaction occurred in January 17.
   You are Required to prepare the necessary journal entries.

6. **From the following Information you are requested to prepare the adjusted Journal entries at December 2014.** $11^{2}/_{3}$

Trial Balance
December 31, 2014

Account Titles	Debit	Credit
Cash	68,000	
Accounts Receivable	24,000	
Prepaid Insurance	6,000	
Equipment	50,000	
Unearned Revenue		80,000
Capital		1,00,000
Notes Payable		20,000
Supplies	7,000	
Salaries Expenses (9 months)	45,000	

Adjustments:

i) Supplies on hand at the end of the year Tk.4500.
ii) Insurance Expires at the rate of Tk. 200 per month.
iii) 10% interest accrued on Notes Payable issued on July 2014.
iv) Depreciation is to be calculated 12% on Equipment.
v) Service Revenue has been earned totally.
vi) Salaries are accrued for 3 months

7. **Following is the Trial Balance of Ahnaf Enterprise for the Quarter ended March 31, 2015:** $11^{2/3}$

Trial Balance

Account Titles	Debit	Credit
Cash	1,14,000	
Accounts Receivable	56,200	
Supplies	10,500	
Prepaid Insurance	24,000	
Equipment	3,00,000	
Capital		2,00,000
Notes Payable		1,00,000
Drawing	6,000	
Salaries Expenses	22,000	
Rent Expense	12,000	
Travel Expense	13,000	
Accounts Payable		1,23,500
Service Revenue		1,34,200
	5,57,700	**5,57,700**

Adjustments:

i) Supplies on hand Tk. 7,500.
ii) Depreciation of Tk. 5,000 per quarter.
iii) Interest accrued on notes payable Tk. 4,500.
iv) Insurance expires at the rate of Tk. 2,000 per month.

You are required to prepare a Worksheet.

8. a) Define Accounting. Who are the user of Accounting Information? $3^{2/3}$

b) From the account balance of the Khan Enterprise prepare a **Trial Balance** as on 31 December, 2014 8

	Taka
Capital	25,000
Purchases	15,000
Account Receivable	8,000
Account Payable	7,000
Building	10,000
Machinery	6,000
Sales	30,000
Rent and Rates	1,000
Allowance for doubtful accounts	2,000
Inventory(01-01-2014)	7,000
Freight In	1,000
Salaries	5,000
Cash	5,000
Drawings	2,000
Commission Expenses	1,000
Insurance	3,000

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
2nd Year 1st Semester B.Sc. Engineering Examination-2015

Course No: STA 204 | Course Title: Theory of Statistics
Full Marks: 70 | Time: 3 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 do you mean by orthogonal transformation and linear orthogonal transformation? 3
   (b) If X_i , (i=1, 2, ….., n) are independent N(0, σ^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, σ^2). 5⅔
   (c) Find the moment generating function of chi square (χ^2) distribution. 3

2. (a) Define chi square (χ^2) distribution. Show that the total probability of a chi square (χ^2) distribution is unity. 5⅔
   (b) Find the mean and variance of chi square (χ^2) distribution. 6

3. (a) Write down the application of chi square (χ^2) distribution. 2⅔
   (b) Write the form of 't' distribution and characteristics of 't' distribution. 4
   (c) Find the variance of 't' distribution. 5

4. (a) Define F-distribution and write down some characteristics of F-distribution. 4⅔
   (b) Find the rth raw moment of F distribution. Also find the mean and variance of F distribution. 7

SECTION-B

5. (a) What do you mean by un-biasedness and consistency? 3
   (b) Define likelihood function. Find the maximum likelihood estimate for the parameter p of a binomial distribution. 5⅔
   (c) Let $x_1, x_2, \ldots, x_n$ is a random sample from a normal population N(μ, 1). Show that $t=\frac{1}{n}\sum_{i=1}^{n} x_i^2$ is an unbiased estimator of (μ^2+1). 3

6. (a) What do you mean by contingency table? For 2×2 contingency table prove that chi-square test of independence gives $\chi^2 = \frac{N(ad-bc)^2}{(a+c)(b+d)(a+b)(c+d)}$; $N = a+b+c+d$. 6⅔
   (b) Two sample polls of votes for two candidates A and B for a public office are taken, one from among the residents of rural areas. The results are given in the table. Examine whether the nature of the area is related to voting preference in this election. Given $\chi^2_{0.05,1}=3.84$ 5

	A	B	Total
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

7. (a) Define test of hypothesis, type I error, acceptance and critical region and standard error. 5
   (b) Write down the steps in hypothesis testing. 3
   (c) The fasting blood sugar (FBS, x) of 15 randomly selected patients are given below: 3⅔

110, 118, 130, 140, 142, 146, 112, 100, 95, 98, 96, 122, 123, 124. 130
Do you think that the mean FBS of patients in the population is 110? It is known that the population variance of FBS is $\sigma^2 = 300$. If σ^2 is unknown, how would you conclude? Given that z =1.96 and $t_{0.05,14}$ =2.145

8. (a) What do you mean by parametric test? Write down the advantages of parametric test. 4⅔
(b) Describe the procedure of sign test that use data from a single sample. 4
(c) The data of blood flow in lung capillaries in 16 patients with neuromuscular weakness have the following sequence of sexes FFFMFFMMMFFFFFFM. 3
Test the null hypothesis that the sequence is random. Given that at 5% level of significance the lower critical value is 4 and upper critical value is not given.