

B.Sc (HONS) IN CSE PART-I, SECOND SEMESTER EXAMINATION, 2018
[According to the New Syllabus]

CSE-510208

Examination Code : 5612

(Digital System Design)

Time—4 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any four questions.]

Marks

1. (a) Describe the organization of a digital computer with figure. 6
- (b) Define parity bit. Why it is significant for transmission of digital signals? 4
- (c) Using 2's complement system subtract 5 from 9. 4
- (d) Define the following terms with examples : 6
 - (i) ASCII Code
 - (ii) BCD Code
 - (iii) Excess-3 Code
2. (a) Prove the universality of NAND gate. 4
- (b) Design a logic circuit with inputs P , Q and R so that output S is HIGH whenever P is 0 or whenever $Q = R = 1$. 6
- (c) Explain how a de-multiplexer can be used as a decoder. 4
- (d) Define : 6
 - (i) Setup time
 - (ii) Hold time
 - (iii) Propagation delay
3. (a) Describe the basic DRAM cell with read, write and refresh operation. 5
- (b) Explain the differences between SRAM and DRAM. 5
- (c) Describe a basic PROM storage cell. 5
- (d) What is shift register? Explain 4 bit shift register with waveform. 5

[Please turn over]

		Marks
4.	(a) What is LCD? Explain BCD to 7 segment decoder.	6
	(b) Draw and explain a complete 4 bit parallel adder with register.	7
	(c) Design and construct a full adder circuit. Explain its operation with truth table.	7
5.	(a) State and prove the De-Morgan theorem with the help of truth table for three variables.	4
	(b) What is Decoder? Explain 3 to 8 line Decoder with truth table and circuit diagram.	6
	(c) Minimize the following function and realize using NAND gate only : $f = \sum m(1, 3, 5, 8, 9, 11, 15) + d(10, 13)$	6
	(d) What should be done in BCD addition when the sum is greater than 9? Explain with example.	4
6.	(a) What is race-around condition? Explain how it can be eliminated.	5
	(b) Perform the following flip-flop conversions : (i) S-R Flip Flop into D Flip Flop (ii) J-K Flip Flop into T Flip Flop	4
	(c) Describe the operation of a successive approximation ADC. What are the main advantages of this type of ADC?	6
	(d) What are the differences between combinational and sequential logic circuits?	5

B. Sc (HONS.) IN CSE PART-I, SECOND SEMESTER EXAMINATION, 2018

[According to the New Syllabus]

CSE-510210

Examination Code : 5612

(Discrete Mathematics)

Time—3 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any four questions.]

Marks

1. (a) Define Cardinality of set, Infinite set and Power set. What is the power set of the set $\{1, 2, 3\}$? 3+2=5
- (b) Let $A_i = \{i, i+1, i+2, \dots\}$. Then $\bigcup_{i=1}^n = ?$ and $\bigcap_{i=1}^n = ?$ 5
- (c) Let A and B be two sets of integers and $f : A \rightarrow B$ be a function that represents $f(x) = 4x + 7$. Is f injective or subjective? 5
- (d) Compute the following sum : $S = \sum_{k=50}^{100} K^2$. 5
2. (a) What is predicate and quantifiers? If $Q(x, y)$ denotes the statement ' $x = y + 3$ '. What are the truth values of the propositions $Q(1, 2)$ and $Q(3, 0)$? 5
- (b) What is the complement of a set? Let A, B and C be sets, show that $\overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}$. 5
- (c) What is duality? Find the duals of $x(y + 0)$ and $\overline{x} \cdot 1 + (\overline{y} + z)$. 5
- (d) Show different types of correspondences of function by figure : 5
 - (i) One-to-one, not onto
 - (ii) Onto, not one-to-one
 - (iii) One-to-one, and onto
 - (iv) Neither one-to-one not onto
 - (v) Not a function

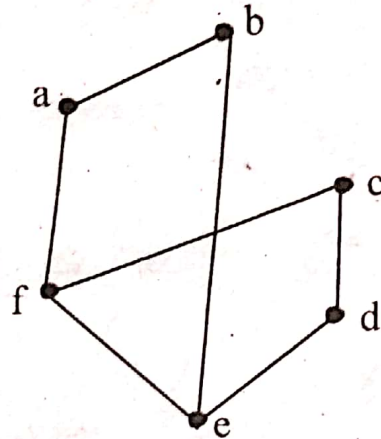
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3. (a) What is mathematical induction? Using mathematical induction, prove that the sum of the first n odd positive integers is n^2 . 5
- (b) Give an indirect proof of the theorem "If $3n + 2$ is odd, then n is odd." 4
- (c) Define sum rule and product rule. How many bit strings of length eight either start with a 1 bit or end with the two bits 00? 6
- (d) State pigeonhole principle. What is the minimum number of students required in a discrete mathematics class to be sure that at least six will receive the same grade, if there are five possible grades, A, B, C, D and F? 5
4. (a) What is relation? Write down the properties of relation. 4
- (b) Consider the following relations on the set of integers : 6
- $R_1 = \{(a, b) \mid a \leq b\}$
- $R_2 = \{(a, b) \mid a > b\}$
- $R_3 = \{(a, b) \mid a = b \text{ or } a = -b\}$
- $R_4 = \{(a, b) \mid a = b\}$
- $R_5 = \{(a, b) \mid a = b + 1\}$
- $R_6 = \{(a, b) \mid a + b \leq 3\}$
- Which of these relations contain each of the pairs (1, 1), (1, 2), (2, 1), (1, -1) and (2, 2)?
- (c) Define partial ordering. Construct a Hasse diagram for $(\{1, 2, 3, 4\}, \leq)$. 6
- (d) Draw the directed graph for the relation : 4
- $R = \{(1, 1), (1, 3), (2, 1), (2, 3), (2, 4), (3, 1), (3, 2), (4, 1)\}$.

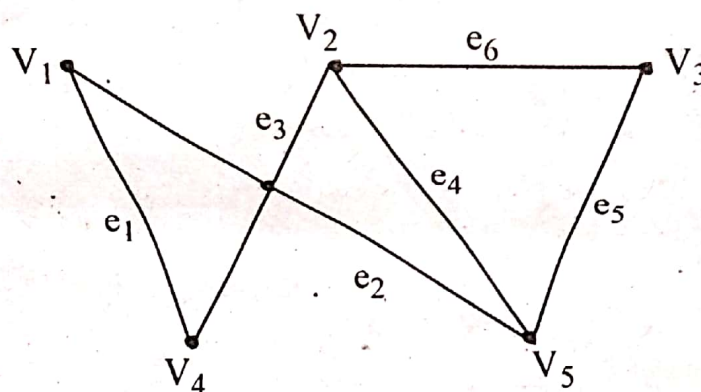
Marks
2+3=5

5. (a) Define multigraph and pseudograph. Is K_4 planar graph or not?

(b) Is the graph shown in figure below bipartite? Justify your answer.



(c) Represent the graph shown in the following figure with an incidence matrix.



(d) Define chromatic number. What is the chromatic number of $K_{3,4}$ and K_5 ?

6. (a) Define Boolean expression and Boolean function.

(b) Prove the absorption law $x(x + t) = x$ using the other identities of Boolean algebra.

(c) Construct a Full Adder circuit using Half Adder circuits.

(d) Simply the Boolean function

$$F = \overline{A}BC + \overline{B}C\overline{D} + \overline{A}BC\overline{D} + A\overline{B}C \text{ using } K\text{-map.}$$

B. Sc (HONS.) IN CSE PART-I, SECOND SEMESTER EXAMINATION, 2018

[According to the New Syllabus]

CSE-510211

Examination Code : 5612

(Linear Algebra)

Time—3 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any four questions.]

Marks

1. (a) Define : Singular matrix, Nilpotent matrix and Hermitian matrix. $2 \times 3 = 6$ (b) If A and B are non-singular matrices, then prove that, $(AB)^{-1} = B^{-1}A^{-1}$. Also prove that, $(A^{-1})^{-1} = A$ and $(A^{-1})' = (A')^{-1}$. 7(c) Define rank of matrix. Find the rank of the following matrix : $2+5=7$

$$A = \begin{bmatrix} 1 & 2 & 0 & -1 \\ 2 & 6 & -3 & -3 \\ 3 & 10 & -6 & -5 \end{bmatrix}$$

2. (a) Define inverse matrix. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then find $A^{-1} + 2A'$. $2+8=10$ (b) Show that, $\begin{vmatrix} -1 & b & c & d \\ a & -1 & c & d \\ a & b & -1 & d \\ a & b & c & -1 \end{vmatrix} = (a+1)(b+1)(c+1)(d+1) \left[1 - \frac{a}{a+1} - \frac{b}{b+1} - \frac{c}{c+1} - \frac{d}{d+1} \right]$. 10

3. (a) Solve the following system of linear equations with the help of matrix : 8

$$x + 2y + z = 2$$

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

$$3x - 4y - 3z = -16$$

(b) (i) Solve the system of linear equations : 6

$$2x + y - 2z = 10$$

$$3x + 2y + 2z = 1$$

$$5x + 4y + 3z = 4$$

(ii) Find the non-trivial solution for the system of linear equations : 6

$$x + 2y - 3z = 0$$

$$2x + 5y + 2z = 0$$

$$3x - y - 4z = 0$$

[Please turn over]

4. (a) Define degenerate and non-degenerate linear equation. Marks
2
 (b) Determine the values of λ such that the following system of linear equations in unknowns x, y and z has (i) a unique solution (ii) no solution (iii) more than one solution : 6

$$x + y + \lambda z = 1$$

$$x + \lambda y + z = \lambda$$

$$\lambda x + y + z = \lambda^2$$

- (c) Show that,
$$\begin{vmatrix} a+b+c & a+b & a & a \\ a+b & a+b+c & a & a \\ a & a & a+b+c & a+b \\ a & a & a+b & a+b+c \end{vmatrix} = c^2 (4a + 2b + c) (2b + c).$$
 6

- (d) Define norm of a vector. Consider $P(3, \lambda - 2)$ and $Q(5, 3, 4)$ in \mathbb{R}^3 . Find the value of λ so that, \vec{PQ} is orthogonal to the vector $(4, -3, 2)$. 6

5. (a) Define linear transformation. Let U and V be two vector spaces over the field F and T_1 and T_2 be linear transformations from U into V then prove that, $T_1 + T_2$ is a linear transformation. 2+5=7

- (b) If S and T be the linear transformation $S, T : \mathbb{R} \longrightarrow \mathbb{R}^3$ defined by $S(x, y, z) = (y, z, x)$ and $T(x, y, z) = (x + y + z, 0, 0)$ then find (i) $(TS)(1, 0, 1)$, (ii) $(ST)(1, 0, 1)$ (iii) $(S + T)(1, 0, 1)$. (iv) $(S - T)(1, 0, 1)$. 8

- (c) Show that the mapping $T : \mathbb{R}^2 \longrightarrow \mathbb{R}^3$ defined by $T(x_1, x_2) = (x_1 + x_2, x_1 - x_2, x_1)$ is linear. 5

6. (a) Define eigen values and eigen vectors. State and prove Cayley-Hamilton theorem. 2+6=8

- (b) Find the eigen values and the corresponding eigen vectors of 12

the matrix $A = \begin{bmatrix} 3 & 1 & 1 \\ 2 & 4 & 2 \\ 1 & 1 & 3 \end{bmatrix}$.

Also verify the Cayley-Hamilton theorem for the matrix A .

B. Sc (HONS.) IN CSE PART-I, SECOND SEMESTER EXAMINATION, 2018*[According to the New Syllabus]***CSE-510212****Examination Code : 5612****(Statistics and Probability)**

Time—3 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any four questions.]

Marks

1. (a) Define statistics. Discuss the characteristics of statistics. 4
- (b) What are the differences between primary data and secondary data? 4
- (c) What is variable? Describe various kinds of variable with example. 6
- (d) Define scale of measurement. Discuss the various type of scale of measurement. 6
2. (a) What is frequency distribution? Discuss the different steps of construction of a frequency distribution. 5
- (b) The daily wages (Taka) of 50 workers are given below : 10
- | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 160 | 88 | 108 | 204 | 139 | 68 | 129 | 101 | 149 | 119 |
| 132 | 103 | 210 | 96 | 104 | 127 | 146 | 89 | 97 | 170 |
| 120 | 187 | 123 | 136 | 108 | 118 | 94 | 149 | 93 | 175 |
| 131 | 191 | 102 | 148 | 163 | 172 | 93 | 104 | 132 | 135 |
| 125 | 195 | 105 | 144 | 187 | 92 | 131 | 136 | 142 | 128 |
- (i) Construct a continuous frequency distribution with suitable size of class interval.
- (ii) Draw a histogram and find mode from histogram.
- (c) Discuss the different measures of central tendency. 5
3. (a) Define median and mode with uses. 5
- (b) Prove that for two non-zero positive values $AM \geq GM \geq HM$. 5
- (c) Calculate Arithmetic mean, Geometric mean and Harmonic mean from the following frequency distribution : 10

Daily sales (Thousand Tk.)	20-30	30-40	40-50	50-60	60-70	70-80
Number of shops	4	7	16	12	6	5

[Please turn over]

4. (a) What is skewness? Describe the different frequency curves based on skewness. 3
- (b) Distinguish between absolute and relative measures of dispersion. 5
- (c) If the obtained marks of 5 students (out of 20) are 8, 7, 6, 3, 12, then prove that $100\sqrt{n-1} > CV$. 4
- (d) Calculate the quartile deviation from the following information : 8

Daily Income (in Tk.)	50	60	70	80	90	100	110	120
Number of workers	10	12	14	16	20	8	4	2

Also develop a box plot.

5. (a) What is scatter diagram? Discuss the different nature of correlation with the help of scatter diagram. 5
- (b) Prove that the value of coefficient of correlation lies between -1 and 1. 5
- (c) Calculate Arithmetic mean and standard deviation for n natural numbers. 5
- (d) Calculate the rank correlation coefficient for the following data giving ranks awarded by two judges to 10 participants in a musical contest : 5

Rank by Judge I	3	5	4	8	9	7	1	2	6	10
Rank by Judge II	4	6	3	9	10	7	2	1	5	8

6. (a) Distinguish between correlation and regression. 5
- (b) If the standard deviation of variable x is 6 and the two regression equations are $12x - 15y + 99 = 0$, $60x - 27y = 321$. Calculate (i) the average value of x and y (ii) correlation coefficient (iii) variance of y . 8
- (c) Observe the following information : 7

		Boys	
		Intelligent	Un-intelligent
Father	Skilled	40	30
	Unskilled	70	54

Do these figures support the hypothesis that skilled fathers have intelligent boys?

B. Sc (HONS.) IN CSE PART-I, SECOND SEMESTER EXAMINATION, 2018*[According to the New Syllabus]***CSE-510213****Examination Code : 5612****(History of the Emergence of Independent Bangladesh)****Time—3 hours****Full marks—80***[N.B.—The figures in the right margin indicate full marks. Answer any four questions.]*

- | | | Marks |
|----|---|-------|
| 1. | (a) What is two nation theory?
[দ্বিজাতি তত্ত্ব কী?] | 2 |
| | (b) Write down in short the origin of the name of Bangla.
[বাংলা নামের উৎপত্তি সম্পর্কে সংক্ষেপে লিখ।] | 6 |
| | (c) What was the main theme of the Lahore Resolution?
[লাহোর প্রস্তাবের মূল প্রতিপাদ্য বিষয় কী ছিল?] | 6 |
| | (d) Why the Six-point demand is called the 'Magnacarta' of the Banagles?
[ছয়-দফা কর্মসূচিকে কেন বাঙালির 'ম্যাগনাকার্টা' বলা হয়?] | 6 |
| 2. | (a) Describe the role of media at home and abroad in the war of liberation.
[মুক্তিযুদ্ধে দেশি-বিদেশি প্রচার মাধ্যমের ভূমিকা বর্ণনা কর।] | 4 |
| | (b) Explain the contribution of India in the liberation war of Bangladesh.
[বাংলাদেশের মুক্তিযুদ্ধে ভারতের অবদান ব্যাখ্যা কর।] | 6 |
| | (c) Discuss the characteristics of the Constitution of 1972.
[১৯৭২ সালে সংবিধানের বৈশিষ্ট্যসমূহ বর্ণনা কর।] | 4 |
| | (d) Discuss the steps taken by the Bangabandhu Government to reconstruct the war ravaged country.
[যুদ্ধবিধ্বস্ত দেশ পুনর্গঠনে বঙ্গবন্ধু সরকারের পদক্ষেপসমূহ আলোচনা কর।] | 6 |

[Please turn over]

- (a) What do you mean by operation search light?
[অপারেশন সার্চ লাইট বলতে কী বুঝে?]
- (b) Evaluate the importance of Mass-upsurge of 1969.
[১৯৬৯ সালের গণ-অভ্যুত্থানের গুরুত্ব মূল্যায়ন কর।]
- (c) Write the importance of the 7th March address of Bangabandhu.
[বঙ্গবন্ধুর ৭ মার্চের ভাষণের গুরুত্ব লিখ।]
- (d) Evaluate the contribution of women community of Bangladesh in the liberation war.
[মুক্তিযুদ্ধে বাঙালি নারী সমাজের অবদান মূল্যায়ন কর।]
4. (a) Who was the first governor of East Bengal? What is bureaucracy?
[পূর্ব বাংলার প্রথম গভর্নর কে ছিলেন? আমলাতন্ত্র কী?] 1+2=3
- (b) Discuss the results and significance of the election of 1954.
[১৯৫৪ সালের নির্বাচনের ফলাফল এবং গুরুত্ব আলোচনা কর।] 7
- (c) Discuss the role of super powers of the world in the liberation war.
[মুক্তিযুদ্ধে বিশ্বের বৃহৎ শক্তিসমূহের ভূমিকা আলোচনা কর।] 5
- (d) Describe the causes and impact of imposition of Martial Law in 1958.
[১৯৫৮ সালে সামরিক শাসন জারির কারণ ও ফলাফল বর্ণনা কর।] 5
5. (a) Discuss the challenges of Mujib government.
[মুজিব সরকারের চ্যালেঞ্জসমূহ আলোচনা কর।] 4
- (b) Write short note on Home coming of Bangabandhu Sheikh Mujibur Rahman.
[বঙ্গবন্ধু শেখ মুজিবুর রহমানের স্বদেশ প্রত্যাবর্তন সম্পর্কে সংক্ষেপে লিখ।] 7
- (c) Narrate the background and phases of the Language Movement in 1952.
[১৯৫২ সালের ভাষা আন্দোলনের পটভূমি ও ঘটনা প্রবাহের বিবরণ দাও।] 7
- (d) What is Basu-Suhrawardi Treaty?
[বসু-সোহরাওয়ার্দী চুক্তি কী?] 2

Marks

3

7

4

6

1+2=3

7

5

5

4

7

7

2

Marks
4×5=20

6. Write short notes on any five of the following :

- (a) Cultural syncretism and religious tolerance
(b) Agortola Conspiracy Case
(c) Genocide
(d) Bengali Nationalism
(e) Military Rule
(f) Declaration of Independence by Bangabandhu
(g) 11-points movement of the students

[যে কোনো পাঁচটি বিষয়ে টীকা লিখ :

- (a) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
(b) আগরতলা ষড়যন্ত্র মামলা
(c) গণহত্যা
(d) বাঙালী জাতীয়তাবাদ
(e) সামরিক শাসন
(f) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা
(g) ছাত্রদের ১১-দফা আন্দোলন]

4

6