Bismillahir Rahmanir Rahim

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. In CSE Semester Final Examination, Spring 2016

Course Code: CSE 1203 Course Title: Discrete Mathematics

Total Marks: **50** *Time:* **2** *Hours* **30** *Minutes*

[Answer any *two* questions from **Group A** and any *three* questions from **Group B**.
Separate answer script must be used for Group A and Group B.]

GROUP –A

1. a) Define Mersenne Prime number and Relative Prime number. 2
   b) What is Chinese Remainder Theorem? Find the solution of the following system of congruence equation by using Chinese Remainder Theorem: 4

$$x \equiv 2 \pmod 3$$

$$x \equiv 4 \pmod 7$$

$$x \equiv 6 \pmod{10}$$

   c) Find the inverse of 5 modulo 11. 2
   d) Define Cryptology. State the Fermat's Little Theorem. 2

$11 = 2 \cdot 5 + 1$

$-2 \cdot 5 + 11 \cdot 1 = 1$

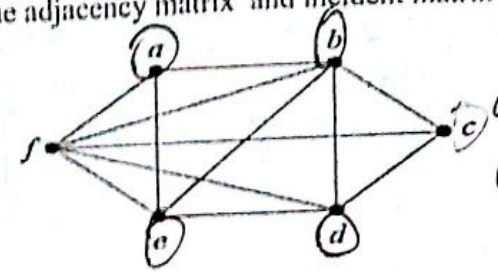
2. a) Why mathematical induction is valid? 2
   b) Use mathematical induction to prove that the sum of the first n odd positive integers is n^2. 3
   c) Write the 1^{st} and 2^{nd} principle of mathematical induction. 3
   d) Suppose f is defined recursively by $f(0) = 3$, $f(n+1) = 2f(n) + 3$. Find f(1), f(2), f(3), f(4). 2

3. a) Define Linear Congruence. What are the solutions of the linear congruence: 2.5
   $3x \equiv 4 \pmod 7$
   b) Define Prime number. Prove that, If n is a composite number, then n has a prime divisor less than or equal to $\sqrt{n}$. 2.5
   c) Express gcd(252, 198) = 18 as a linear combination of 252 and 198 by the successive division method of Euclidian algorithm. 3
   d) Find the GCD of 252 and 198 using Euclidian algorithm. 2

GROUP – B

4 a) Describe the Inclusion - Exclusion principle with an example. 2
   b) How many integers from 1 to 1000 are either multiples of 3 or multiples of 5? 2.5
   c) State the generalized pigeonhole principle. There are 50 baskets of apples. Each basket contains no more than 24 apples. Show that there are at least 3 baskets containing the same number of apples. 3
   d) How many bit strings of length four do not have two consecutive 1s? Construct the tree diagram. 2.5

5 a) What is Graph? Find the adjacency matrix and incident matrix of the following graph 3



a, b, c, d f

a 1

b

c.

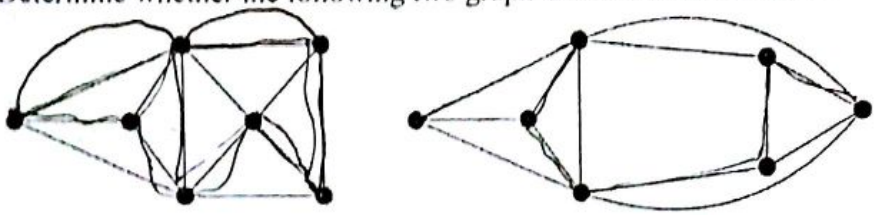
d

b) Define: Hamiltonian path, Eularian Circuit. 2

c) Draw the Following Graph 2

i) K_5 ii) $K_{2,3}$

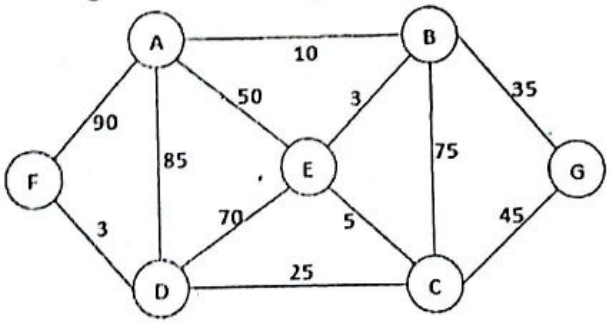
d) Determine whether the following two graph G and H are isomorphic or not. 3



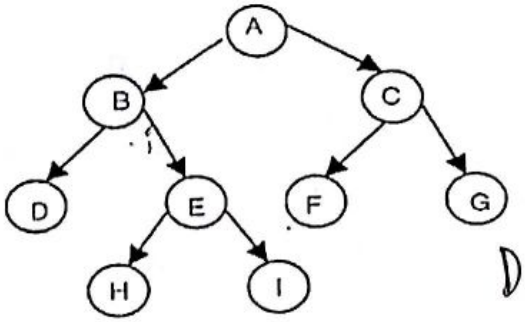
Graph G *Graph H*

6 a) Define Binary Tree and Binary Search Tree (BST). Represent the expression (a-b)/((c*d)+e) using a binary tree. 4

b) Use Kruskal's or prim's Algorithm to find a spanning tree of the following graph: 3



c) Visit the following tree using all three (pre-order, in-order, post-order) tree traversal algorithms: 3



A, B C F G

D E F G

H I

A, B, D, E C F G

A, B, D E H I C

H I

B A C

D E F G

H I

D B E A F C G

H I

B C A

D E F G

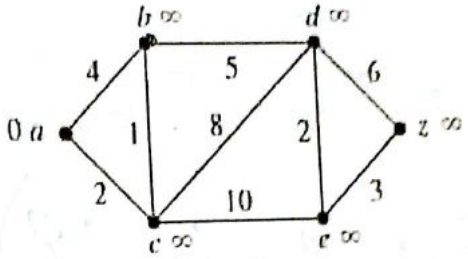
H I

D, E B F G C A

H I

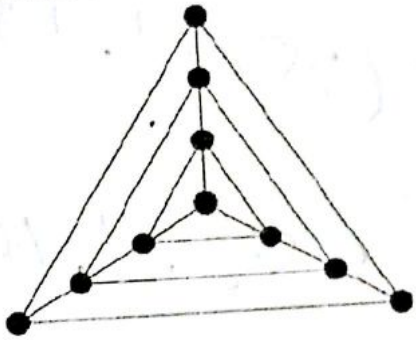
D H I E B F G C A

7 a) Find the shortest path from a to z using Dijkstra's algorithm:



2+1+5
2+8+6
2+10+3 =

b) What is chromatic number? Find the chromatic number of the following graph:



c) Write Down the differences between Tree and Graph.

International Islamic University Chittagong
Dept. of Computer Science & Engineering
Final examination, Spring-2016
Course code: STAT-1201, Course Title: Statistics

Total Marks: 50 **Time: 2.30 hours**

*[Answer any Two questions from **Group-A** and any **three** questions from **Group-B**; Separate answer script must be used for Group-A and Group-B]*

Group-A

1. (a) What is coefficient of determination? If $r^2 = 0.72$ what does the coefficient of determination equal? 1+1

(b) Following figures give the rainfall in inches for 7 districts and the production of rabi crop in hundred kgs per acre of a particular year. 5

Rainfall:	30	19	24	26	28	30	12
Rabi Production:	25	17	40	50	41	62	18

Compute coefficient of correlation between the rainfall and production and comment.

(c) Distinguish between simple correlation and simple regression. 3

2. (a) What are regression coefficients? Point out the properties of regression coefficients. 1+3

(b) The following data give the hardness(X) and tensile strength(Y) of 7 samples of metal in certain units. 5+1

X	146	152	158	164	170	176	182
Y	75	78	77	89	82	85	86

(i) Obtain the regression equation of y on x.

(ii) Estimate the Y when X is 79.

3. (a) Define Spearman's rank correlation. Mention its uses. 2+2

(b) The marking of 10 trainees in two skills, programming and analysis are as follows. 3

Programming:	3	5	8	4	7	10	2	1	6	9
Analysis:	6	4	9	8	1	2	3	10	5	7

Compute Spearman's rank correlation coefficient and comment.

(c) Interpret the following correlation coefficients: (i) r = 1.5; (ii) r = -0.2; (iii) r = 1; (iv) r = 0.70 3

Group-B

4. (a) Define the followings with example: 3
(i) Random experiment ;(ii) Mutually Exclusive Event and (iii) Sample Space

(b) Define conditional probability. State additive law and multiplicative law of probability for two events. 3

(c) Suppose H and T are two events. P(H) = 0.2, P(T) = 0.4, P(HT) = 0.12 4
(i) Are H and T independent? (ii) Find P(H U T) (iii) P(T | H) and (iv) Find P($\overline{H}$)

5. (a) Define random variable with example. 2

(b) Suppose X is a discrete random variable with probability function. 5

Values of X:x	-1	0	1	2	3
f (x)	0.2	0.1	0.25	0.15	0.3

Find the value of (i) P[X≤ 1]; (ii) P[-1< X <2]; (iii) P[X >0] ; (iv) E[X] and (v) S.D[X]

(c) Distinguish between probability function and probability density function. 3

6. (a) What is the mathematical expectation of a random variable? Write down the properties of variance of a random variable. 4

(b) A continuous random variable X has the following probability density function: 6

$f(x) = kx$; $1 \le x \le 3$

Find the value k and Var(x).

7. (a) What is normal distribution? Write some important uses of normal distributions. 1+2

(b) What is poisson distribution? Write some practical situations suitable for poisson distribution. 4

(c) In a community, the probability that a newly born child will be boy is 1/2. Among the 4 newly born children in that community, what is the probability that 1+2
(i) at least two boys (ii) no boys (iii) exactly one boy and (iv) at most two boys.

بسم الله الرحمن الرحيم

International Islamic University Chittagong
Department of Computer Science & Engineering
B.Sc. in CSE Semester Final Examination, Spring-2016
Course Code: MATH-1201 Course Title: Mathematics-II

Total Marks: 50 *Time: 2 hours & 30 minutes*

[Answer any two questions from Group-A and any three questions from Group-B; Separate answer script must be used for Group-A and Group-B]

Group-A

1. a) Transform the equation $17x^2 + 18xy - 7y^2 - 16x - 32y - 18 = 0$ to one in which there is no term involving x, y and xy, both sets of axis being rectangular 6

   b) Prove that the homogeneous second degree equation always represents a pair of straight lines through the origin 4

2. a) If two straight lines represented by $x^2(tan^2\theta + cos^2\theta) - 2xy\tan\theta + y^2sin^2\theta = 0$ makes angle α and β with x-axis then show that, $\tan\alpha - \tan\beta = 2$ 5

   b) If one of the lines $ax^2 + 2hxy + by^2 = 0$ be coincident with one of the lines $a_1x^2 + 2h_1xy + b_1y^2 = 0$ then show that, $(ab_1 - a_1b)^2 = 4(a_1h_1 - ah1(bh1 - b1h)$ 5

3. Reduce the equation $14x^2 - 4xy + 11y^2 - 44x - 58y + 71 = 0$ to the standard form and identify the conic. And find the length of the axes, eccentricity, coordinate of the vertex, length and equation of latus rectum, equation of the directrix of the conic. 10

Group-B

4. a) Define direction cosine and direction ratio. If a line makes angles α, β and γ with the axes, then show that, $sin^2\alpha + sin^2\beta + sin^2\gamma = 2$ 5

   b) A line through the origin meet the straight line joining the points $(-9, 4, 5)$ $(11, 0, -1)$ Perpendicularly. Find the coordinate of the intersection 5

5. a) Find the equation of the plane that passes through $(2, -3, 1)$ and and is normal to the line joining the points $(3, 4, -1)$ and $(2, -1, 5)$ 5

   b) Define Tetrahedron. Find the volume of the tetrahedron formed the planes whose equations are $my + nz = 0$, $nz + lx = 0$, $xl + my = 0$ and $lx + my + nz = p$ 5

6. a) Define shortest distance. Find the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ Also find the equation of SD 5

   b) Prove that the lines $x = ay + b = cz + d$ and $x = \alpha y + \beta = \gamma z + \delta$ are coplanar if $(\gamma - c)(a\beta - b\alpha) - (\alpha - a)(c\delta - d\gamma) = 0$ 4

7. a) Show that the sphere $x^2 + y^2 + z^2 - 2x - 2y - 2z + 1 = 0$ touches the coordinate axes, find the coordinates of the point of contact 3

   b) A plane passes through a fixed point (l,m,n) and cuts the axes in A,B,C. Show that the locus of the centre of the sphere OABC is $\frac{l}{x} + \frac{m}{y} + \frac{n}{z} = 2$ 3

   c) Show that $x^2 + y^2 + z^2 - x - y + z + 1 = 0$ represents an ellipsoids, find its Centre, length of semi axes.

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International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Spring 2016

Course Code: EEE 1205 Course Title: Electronic Devices and Circuits

Total marks: *50* Time: 2 hours 30 min

[Answer any *two* questions from **Group-A** and any *three* questions from **Group-B**; Separate answer script must be used for Group-A and Group-B.]

Group-A

1.a) What is transistor? Why it is called so? 02

b) Explain the working principle of NPN transistor with neat diagram. 04

c) Draw the input and output characteristics curve for common emitter configuration and explain properly. 04

2.a) Discuss the condition of biasing of a BJT. What are the techniques used for biasing? Briefly explain the voltage divider biasing technique with proper sketch. 05

b) Determine the dc bias voltage V_{CE} and the current I_C for the emitter bias circuit in Figure 2(b). 05

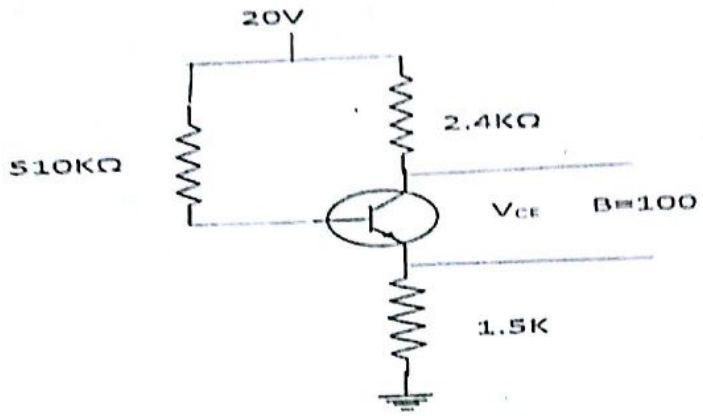

Figure 2(b)

3.a) Explain the load line of a bipolar junction transistor. 02

b) Derive the equation $I_c = \beta I_\beta + I_{cEo}$ Where the symbols carry their usual meaning. 04

c) What are α and β? Find the relation between them. 02

d) Explain how a transistor act as an amplifier? 02

Group-B

4.a) Draw basic construction of an n-channel enhancement type MOSFET and explain its basic operation and characteristics. 05

b) Sketch the transfer characteristics for an n-channel depletion types MOSFET with I_{DSS} = 12mA and V_p = -6V. 05

5.a) What is OPAMP? Why it is called operational Amplifier? Draw the ideal and practical equivalent circuit of an OP-AMP. 04

b) Derive the output voltage equation of an inverting OPAMP. 04

c) What are the basic features of operational Amplifier? 02

6.a) What point should be considered in the design of SCR gate signal? 02

b) What is SCR? Explain its current-voltage characteristics with proper diagram. 04

c) Write Short note on any of the followings: 04

i) DIAC

ii) UJT

7.a) Differentiate between a BJT and FET. 02

b) A summing OPAMP shown in Figure 7(b). Calculate the output voltage. 04

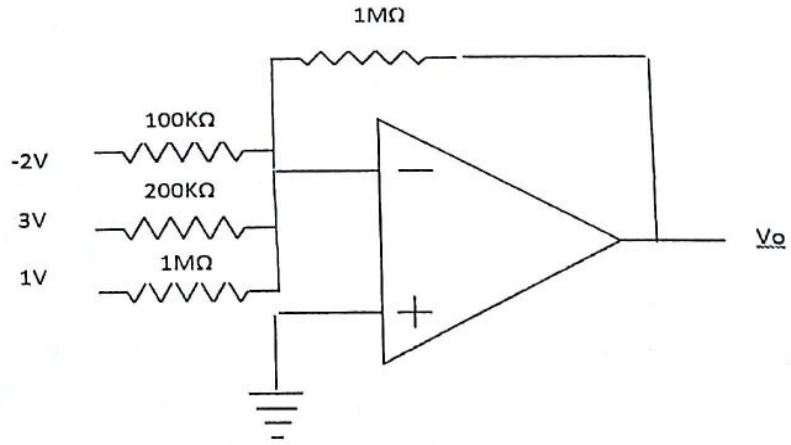

Figure 7(b)

c) Describe the basic principle of JFET with input output wave form. 04

International Islamic University Chittagong

Study Class Examination (written), Spring-2016

2nd Semester (other than *Shari'ah*)

Full Marks: 50 **Time: 02:00 Hours**

Group: A

1. Define the following terms: **10×1=10**

(a) *Tafkhem* and *Tarqeq* (b) *Gunnah* (c) *Madd*

(d) *Waqf* and *Ibtida* (e) *Qalqalah* (f) Letter of *Isti'la*

(g) *An-Nasr* (h) *Al-Kafirun* (i) *Al-Kauther*

(j) *Al-Ma'un*

Group: B

Answer any three of the following questions: **3×10=30**

2. Discuss the rules of *Tafkhem* and *Tarqeq* in the letter of Raa & Lam with example.
3. Identify the kinds of *Madd* in the following words mentioning the reason: **(any five)**

(a) بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ (b) رِحْلَةَ الشِّتَاءِ وَالصَّيْفِ

(c) الَّذِي أَطْعَمَهُم مِّن جُوعٍ (d) لِإِيلَٰفِ قُرَيْشٍ

(e) يٰسٓ (f) فِي دِينِ اللَّهِ أَفْوَاجًا

4. Describe some types of *Waqf* and *Ibtidah* with example.
5. Write down the meaning with short explanation of the following *Surahs*: **(any two)**
   (a) *Surah al- Ma'un*;
   (b) *Surah al-Kauther;*
   (c) *Surah an-Nasr.*

Group: C

6. Answer any one of the following questions: **1×10=10**

a. Discuss the far reaching effect of reserve robbing in our national economy;
   Or
b. Evaluate Muhammad Ali, the greatest, as the epitome of humanity.

International Islamic University Chittagong (IIUC)

Center for University Requirement Courses (CENURC)

Final Examination, Spring-2016

Course Code: URIS: 1203 **Course Title: Introduction to *'Ibadah***

Time: 2:30 hrs. **Full Marks: 50**

Answer any **five** of the following questions.
(All questions are of equal value)

1. (a) Describe the importance of *Salah* in Islam.
   (b) What are the most important teachings of Islam? Explain.

2. Suppose, you want to perform two *Rakʿahs* of *Salah*, then how do you perform it? Explain.

3. On whom *Zakah* is obligatory? Who is eligible to receive it? Explain in the view point of Islam.

4. What does *Zakah* mean? Discuss role of *Zakah* in solving the economic problems faced by the human being.

5. Define the *Sawm* literally and terminologically mentioning the things that invalidate the *Sawm*.

6. Describe some benefits of *Sawm* in the view point of Islam.

7. Compare some important lessons of *Hajj* with the reality of Muslim's present life elaborately.

Bismillahir Rahmanir Rahim

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Spring- 2016

Course Code: PHY- 1201 Course Title: Physics-II

Total marks: ***50*** Time: 2 and half hours

[Answer any ***two*** questions from **Group-A** and any ***three*** questions from **Group-B;**
Separate answer script must be used for Group-A and Group-B.]

Group-A

1. a) Define: (i) Single Crystal (ii) Lattice — 02
   b) Show that in a crystal of cubic structure, the distance between the planes with Miller indices *h, k, l* is equal to $d = \frac{a}{\sqrt{h^2+k^2+l^2}}$, where *a* is the lattice parameter. — 05
   c) Lead is face-centered cubic with an atomic radius of r =1.674 A.U. Find the spacing of (220) planes. — 03

2. a) Define R-C circuit. — 02
   b) Obtain an expression for the decay of charge in a capacitor through a resistance. — 05
   c) A capacitor of capacitance 1×10^{-7} F is first charged and then discharged through a resistance of 1×10^{7} ohm. Find the time, the potential will take to fall to half its original value. — 03

3. a) Derive an expression for mean value of alternating emf. — 03
   b) Find out the packing fraction of fcc crystal . — 04
   c) Draw the planes (101), (010) and (001). — 03

Group-B

4. a) State the postulates of the special theory of relativity. — 02
   b) Explain "A moving clock always appears to go slow". — 05
   c) The mean life of π meason is 2×10^{-8} Sec. Calculate the mean life of a meson moving with a velocity of .8 c. — 03

5. a) Write down the postulates of Bohr atom model. — 02
   b) Obtain an expression for the total energy of a hydrogen atom. — 05
   c) At what speed must the electron revolve round the nucleus of a hydrogen atom in order that it may not be pulled into the nucleus by electrostatic attraction? Calculate its orbital energy. — 03

6. a) State the laws of radioactive disintegration. — 02
   b) What is half-life period? Derive an expression for the half -life period. — 05
   c) 1 gram of radium is reduced by 2.1 mg in 5 years by α-decay. Calculate the half-life period of radium. — 03

7. a) Define binding energy. — 01
   b) Calculate the binding energy for $_{17}Cl^{35}$. — 03
   c) Define the terms: (i) Photo electric effect (ii) Compton effect — 06