Institute of Information Technology
Jahangirnagar University, Savar, Dhaka
2nd Year 2nd Semester B.Sc. (Hons.) Final Examination 2016

Course Code: IT-2201
Course Title: Information System Analysis
Total Marks: 60
Times: 3 Hours

(Sequence must be maintained in answering each of the questions)
Answer any five (5) questions:

1. a) What is use case diagram? How types of relationships are there in it? 4.0

Suppose in your institute, at the beginning of each semester students may request a course catalogue containing a list of course offerings for the semester. Information about each course, such as professor, department, and prerequisites will be included to help students make informed decisions.
The new on-line registration system will allow students to select four course offerings for the coming semester. In addition, each student will indicate two alternative choices in case a course offering becomes filled or canceled. No course offering will have more than ten students. No course offering will have fewer than three students. A course offering with fewer than three students will be canceled. Once the registration process is completed for a student, the registration system sends information to the billing system, so the student can be billed for the semester.
Professors must be able to access the on-line system to indicate which courses they will be teaching. They will also need to see which students signed up for their course offering. For each semester, there is a period of time that students can change their schedules. Students must be able to access the on-line system during this time to add or drop courses. The billing system will credit all students for courses dropped during this period of time.

b) Considering the above situation, identify business actor and business requirements use cases. 4.0

c) Considering the above situation, construct use case model diagram. 4.0

2. a) The Capability Maturity Model (CMM) was developed by the Software Engineering Institute at Carnegie Mellon, and, is widely used by the both the private and private sectors. What is the purpose of the CMM framework and how does it achieve this? 4.0

b) Write down the principles of system development process. What are the FAST phases of system development? 3.0

c) The PIECES framework was developed by James Wetherbe as a means to classify problems. What kind of categories of PIECES framework and then 5.0

categories the following problems using the PIECES framework:

i. Duplicate data is stored throughout the system.
ii. There is a need to port an existing application to PDA devices.
iii. Quarterly sales reports need to be generated automatically.
iv. Employees can gain access to confidential portions of the personal systems.
v. User interfaces for the inventory system are difficult and confusing, resulting in a high frequency of incorrect orders.

3. IIT is going to arrange a National Project Fair where all the universities in Bangladesh can take part. IIT proposed an organization committee. There are five subcommittees such as venue management committee, registration and reception committee, Food committee, Project review committee and technical and logistic support committee. Each committee has some specific tasks. Project review committee would select best three among the projects displayed in the fair and they would be rewarded. There are some criteria for participate in this fair. Otherwise project would be disqualified. The criteria are:

- Project completed not more than one year before the current date.
- Project should be based to IT or implements new and innovative idea using any particular technology.
- The author(s) of the project can either the current students or ex-student

a) Draw a system decomposition diagram with the tasks you would suggest for all the committees mentioned above. 6.0
b) Draw decision table and decision tree for project selection policy. 3+3

4. Consider a book store in a shopping mall. The customer selects the books from racks to purchase. The customer brings selected books to cashier. The cashier scans each item with checkout system to prepare an order. The cashier requests to customer for payment. The customer gives credit card to cashier. The verifier and checkout system scans the card. The verifier accepts the card and payment is accepted. Customer signs the credit card slip. The purchased books are handed over to customer.

a) Draw a class diagram considering above situation. 4.0
b) Draw a sequence diagram for bookstore checkout system. 4.0
c) Draw an activity diagram for bookstore checkout system. 4.0

5. Online shopping site **www.akhoni.com** provides discount deals on many products and travel packages. They sell watches, clothes, jewelry and fashion accessories for men, women and children. They also sell computer & electronics accessories, books; foods and mobile phones. They offer tours to Cox's Bazar by AC buses or non AC buses. To purchase their products you have to create a user account, then place an order and then pay online. Products are delivered to your home.

Institute of Information Technology (IIT)

2nd year 2nd Semester Final exam-2016

Digital Logic Design (DLD), Course Code: IT#2203

Total Marks#60, Time: 3Hrs

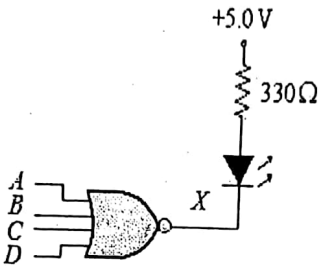
Answer any 5 Questions:

1	a)	Define Analog and Digital Systems in communication.	3
	b)	Mention the advantages of Digital techniques.	2
	c)	Draw the Voltage assignments range in binary digital system.	3
	d)	Discuss the Read and Write operations steps in RAM with block diagram of a memory cell.	4
2		Proof the following Theorems:	
	a)	x+x=0, x.x=x	3
	b)	(x+y) =xy	3
	a)	Draw the EXOR and EXNOR Gates and explain the working logics with the truth table.	3
	d)	Prove that NAND gate is Universal Logic gate.	3
3	a)	What are the important parameters of IC logic family?	3
	b)	Define: Fan-out, Noise Margin	3
	c)	Draw a 1 bit memory cell basic FF with NAND and NOR gates	3
	b)	Draw the IC-7404 and 7400 internal design with gates.	3

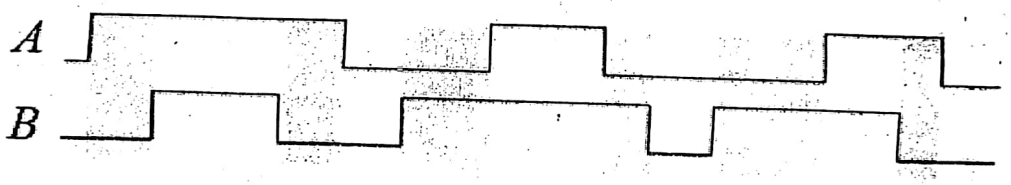
4 a) Mention the basic Logic Functions and the basic System Functions. 3

b) ASCII letters have a 1 in the bit 5 position for lower case letters and a 0 in this position for capitals. (Bit positions are numbered from right to left starting with 0.) What will be the result if you ORed an ASCII letter with the 8-bit mask 00110001? 2

c) When the LED is ON for the circuit shown? 2



d) 2



If the A and B waveforms are both inverted for the above waveforms, how is the output affected in case of XOR Gate?

e) Illustrate the rule $A+\bar{A}B=A+B$ with a Venn diagram. 3

5 a) Why Karnaugh Map is important in digital logic design? 1

b) When you should use Quine-McCluskey method? 1

c) Represent the following function into K-Map: 4

F=A'B'CD+A'BC'D+AB'C'D+ABCD' + AB'C'D' + ABCD

d) F=(ABCD)= (0,1,3,7,8,12) + dc (5,10,13,14) 4

	e)	Why cell changes occurs like 01 then 11 not 10 in K-Map ?	2
6	a)	Define the combinational circuit with block diagram.	2
	b)	What are the steps involved with designing combinational circuit?	2
	c)	Implement a Full adder circuit.	4
	d)	Design a 3 to 8 line Decoder	4
7	a)	What is the difference between sequential and combinational circuit?	2
	b)	Describe briefly with timing diagram the SR Flipflop. What is the disadvantage of SR Flipflop? How to solve the problem?	4
	c)	What is race around condition? Describe briefly with necessary figure. How to solve it?	3
	d)	How FFs can be used for frequency division process? Describe.	3

2nd Year 2nd Semester B.Sc. (Hons.) Final Examination 2017
Institute of Information Technology
Jahangirnagar University

Course Title: Data Communication **Course Code:** IT2205

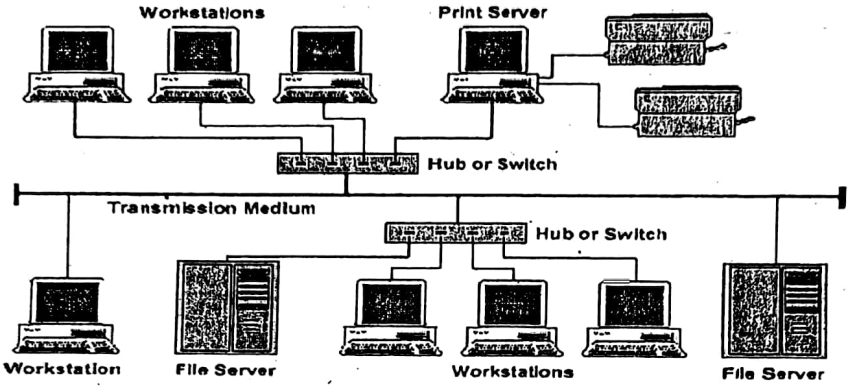
Total Marks: 60 **Time:** 3 Hr.

Answer any five of the following questions:

1. a. Why are protocols needed? What are the advantages of a multipoint connection over a point-to-point one? 4

   b. For ***n*** devices in a network, what is the number of cable links required for a mesh, ring, bus and star topology? 4

   c. 4



In the above figure, suppose a workstation wants to send message to another workstation. Since the communication is through the switch, does the switch needs to have an address to pass the message? Explain.

2. a. Assume we want to connect two isolated hosts together to let each host communicate with the other. Do we need a switch between the two? Explain. 2

   b. Assume we have created a packet-switching internet. Using the TCP/IP protocol suite, we need to transfer a huge file. What are the advantage and disadvantage of sending a large packet? 4

   c. Match the following to one or more layers of the TCP/IP protocol suite: 4
      i) Route determination
      ii) Connection to transmission media
      iii) Providing services for end user
      iv) Responsibility for handling frames between adjacent nodes.

   d. Assume we need to download text documents at the rate of 100 pages per second. What is the required bit rate of the channel? 2

3. a. Can we say whether a signal is periodic or nonperiodic by just looking at its frequency domain plot? How? 4

   b. Briefly discuss three types of transmission impairment. 6

   c. A file contains 2 million bytes. How long does it takes to download this file using a 56-Kbps channel? 2

4. a. Distinguish between synchronous and asynchronous transmission. 3

b. Draw functional block diagram of a PCM and explain how voice signal is converted into PCM signal. 5

c. A signal has four data levels with a pulse duration of 1 ms. Calculate the pulse rate and bit rate. 2

d. What sampling rate is needed for transmission of voice signal? What is the bit rate, assuming 8 bits per sample? 2

5. a. i) What is the significance of twisting in twisted-pair cable? Explain. 3
ii) What is the purpose of cladding in an optical fiber?

b. How does sky propagation differs from the line-of-sight propagation? 2

c. A beam of light moves from one medium to another medium with less density. The critical angle is 60^0. Do we have refraction or reflection for each of the following incident angle? Show the bending of the light ray in each case. 3
   i) 40^0
   ii) 60^0
   iii) 80^0

d. What are the reasons of choosing packet switching over circuit switching? 4

6. a. Explain multiplexing and demultiplexing process using suitable diagram. Assume that a voice channel occupies a bandwidth of 4KHz. We need to combine four voice channels into a link starting from channel bandwidth 20KHz. Show the configuration with the use of guard band of 1 KHz. 6

b. Draw the digital signal hierarchy for the generation of T-1 and E-1 frames. 4

c. Calculate the time duration for a T-1 frame. 2

7. a. Generate a table for the following dataword using Hamming code C(7,4). 4
0100, 0111, 1111, 0000.
Show that Hamming code C(7,4) can detect two bit errors but not necessarily three-bit error by testing the code in the following cases. The character Δ means no error; the character "E" means an error.
   I. Dataword 0100. Burst error: ΔEE Δ ΔΔΔ
   II. Dataword 1111. Burst error: E Δ E Δ ΔΔ E

b. Given the dataword 1010011010 and the divisor 10111. 6
   i) Show the generation of the codeword at the sender site
   ii) Show the checking of the codeword at the receiver site.

c. What is the difference between simple parity check and two-dimensional parity check? Explain with example. 2

Institute of Information Technology
Jahangirnagar University

2nd Part 2nd Semester B.Sc. (Hons) Final Examination-2016

Course Code: IIT 2207 Course Title: Ordinary and Partial differential Equations

Time: 3 Hours Full Marks: 60

Answer any **FIVE** questions
All parts of a particular question must be answered consecutively

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1(a) Define order and degree of a differential equation. Write an ordinary differential equation of order 2 and degree 2. 2

(b) Solve : $(x^2 - xy + y^2)dy + y^2 dx = 0$ 5

(c) Reduce the following differential equation to homogeneous form and solve it. 5

$$\frac{dy}{dx} = \frac{y - x + 1}{y + x - 5}$$

2(a) Define linear differential equations. What do you mean by Integrating factor (I.F.)? 2

(b) Solve: $\frac{dy}{dx} + y\tan x = x^2 \cos^2 x$ 5

(c) Separate the variables of the ODE $(1 - x^2)(1 - y)dx = xy(1 + y)dy$ and solve it. 5

3(a) What is the condition that the differential equation may be exact? 4
Solve: $(2xy^3 + y\cos x)dx + (3x^2 y^2 + \sin x)dy = 0$

(b) Solve: i) $(1 + e^{x/y})dx + e^{x/y}(1 - x/y)dy = 0$ 8

ii) $(\cos y + y\cos x)dx + (\sin x - x\sin y)dy = 0$

4(a) Solve the simultaneous differential equations: (D+4)x + 3y = t and (D + 5)y + 2x = e^t 6

(b) Find the general solution of the PDE $\left(\frac{y^2 z}{x}\right)p + xzq = y^2$ where $p = \frac{\partial z}{\partial x}$, $q = \frac{\partial z}{\partial y}$. 6

5(a) Define partial differential equations. Form a partial differential equation from 5

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

(b) Solve: (y+z)p +(z + x)q = (x + y) 5

(c) Find the auxiliary equation of the PDE $\left(\frac{y - z}{yz}\right)p + \left(\frac{z - x}{zx}\right)q = \frac{x - y}{xy}$. 2

6(a) Define Fourier series of a function. 6
Expand the function $f(x) = x\sin x$, $-\pi < x < \pi$ in a Fourier series.

(b) Define Fourier transform. Find the Fourier transform of $F(x)$ defined by 6

$$F(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$$,and hence evaluate $\int_{-\infty}^{\infty} \frac{\sin pa \cos px}{p} dx$.

7(a) If $F(t)$ has period $T > 0$, then prove that $L\{F(t)\} = \frac{\int_0^t e^{-st} F(t)dt}{1 - e^{-st}}$. 6

(b) Solve the following initial value problem by Laplace transform: 6
$Y'' + Y = 8\cos t$, $Y(0) = 1$, $Y'(0) = -1$.

Jahangirnagar University

Institute of Information Technology (IIT)

2nd Part 2nd Semester B.Sc. (Hons) Final Examination-2016

Session: 2014-15

Course Code: IIT 2209 | Course Title: Computational Mathematics

Time: 3 Hours | Full Marks: 60

Answer any **FIVE** questions

All parts of a particular question must be answered consecutively

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1(a) What do you mean by argument, entry and interval of differencing? 3

(b) Find $\Delta^n\left(\frac{1}{x}\right)$, where interval of differencing is 1. 4

(c) Find a real root of the equation $3x - \sqrt{1 + sinx} = 0$ correct to five decimal places by iteration method. 5

2(a) What is an iterative technique? How is it implemented on a Computer, and how we decide initial guess values for solving a polynomial equation? 5

(b) Find the real root of the equation $x^3 + x^2 = 1$ by iteration method 4

(c) Discuss the situations where the fixed-point iteration process may not converge to a solution. 3

3(a) Write the Bisection algorithm and Fixed-Point Iteration method. 3

(b) Construct the power form of the straight line $p(x)$ which takes on the value 5

p(100)= 3/7 and

p(101)= - 4/7

Also solve this by using shifted-power form and compare the results.

(c) Find a root of f (x) = 3x + sin(x) - exp(x) = 0 by usingBisection Method up to four decimal places. 4

4(a) Write the algorithm of Regula-Falsi Method and explain its geometric interpretation. 3

(b) Solve $2x^3 - 2.5x - 5 = 0$ for the root in the interval [1, 2] by Regula-Falsi Method. 5

(c) Find the population of Dhaka division for the year 2010 from the given data by using method of curve fitting. 4

Year (x)	1991	2001	2011	2021
Population (y)/cores	30	31.5	34.8	39.2

5(a) Sketch and define linear Interpolation and Extrapolation 4

(b) Table below gives values of square of integers. Using the linear interpolation formula estimate the square root of 5.25. Compare and comment on the results. 4

x	2	3	4	5	6	7
x^2	4	9	16	25	36	49

(c) The population of a certain city in given below: Find the rate of growth of population in 1921 and 1961. 4

Year(x)	1921	1931	1941	1951	1961
Population in thousand (y)	19.96	38.65	58.81	77.21	94.61

6(a) Evaluate the first and second derivative of $\sqrt{x}$ at $x = 15$ from the following data 6

x	15	17	19	21	23
$y = \sqrt{x}$	3.873	4.123	4.354	4.583	4.796

(b) Find $\int_4^{5.2} lnxdx$ by using (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}$ rule (iii) $\frac{3}{8}$ rule (iv) Weddle's rule. 6

7(a) Explain Gauss Elimination Method and solve the following linear system by Gauss elimination method. 6

$$x + y + z = 3$$
$$x + 2y + 2z = 5$$
$$3x + 4y + 4z = 11$$

(b) Solve the initial value problem $y' = -2xy^2$, $y(0) = 1$ for y at $x = 1$ with step length .2 using Taylor series method of order four. 6