

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

B.Sc. (Engg.) 4th Year 2nd Semester Final Examination – 2013 (Session: 2008–09)

Course Code: CSE 4202 Course Title: E-commerce and Web Engineering

Marks: 50

Time: 03:00 hrs.

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) Define web application. What are the categories of web application? 2
(b) In which case will you go for a Transactional web application? 2
(c) What do you mean by Non-linearity of web application? How can you reduce cognitive overload? 1.5+1.5=3
(d) What technical context should you consider while developing web applications? 3
2. (a) How does Requirement Engineering for web Engineering differs from Requirement Engineering for conventional software system? Discuss in brief. 5
(b) From a content model of web application which information can you retrieve? What are the diagrams used for content modeling? 2
(c) Describe the links used for HDM and WebML method. 3
3. (a) What are the objectives of presentation modeling? Describe the concepts of customization modeling. 2+3=5
(b) Give a definition to the architecture of a web application. 1
(c) What are the factors and constrains that influence the development of web application architecture? Hence, describe any one of those. 1+3=4
4. (a) What do you mean by pattern and framework of web application? 1+1=2
(b) Briefly describe the components of generic web application architecture 3
(c) Briefly describe the anatomy of an ASP.Net web page. 3
(d) What are the differences between an application server and web server? 2
5. (a) Define Hypertext and Hypermedia. 1.5
(b) What do you mean by stateful and stateless communication? 1.5
(c) What do you mean internal and external style sheet? 2
(d) What are XML, XSL, and DTD? Explain with simple example. 3
(e) What is the use cookie? What do you mean by web services? 2
6. (a) What is the concept of testing in web application? 2
(b) What is E-commerce? What are the challenges of E-commerce? 3
(c) Explain the characteristics of conventional and agile testing approaches and show how they differ. 3+2=5
7. (a) What is encryption? Why is it important for today's web space? 4
(b) Briefly discuss HTTP over SSL (Secure Socket Layer). 6

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B.Sc. (Engg.) 4th Year 2nd Semester Final Examination – 2012 (Session: 2008–09)

Course Code: CSE 4204 Course Title: Digital Image Processing

Marks: 50

Time: 03:00 hrs.

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is digital image processing? Name some fields that use digital image processing. 1+2=3
(b) What do you mean by *brightness adaptation* and *brightness discrimination*? What is *weber ratio*? Describe an experiment used to determine human visual system's *brightness discrimination*. 2+1+2=5
(c) Briefly describe different types of sensor arrangement for image acquisition. 2

2. (a) Discuss the basic concept of image acquisition and sampling. 3
(b) Discuss the ultimate effects of abruptly reducing spatial resolution and intensity levels of a digital image. 2
(c) What is *nearest neighbor* interpolation? Explain how this method is used to zoom a digital image? Give a relative comparison between *nearest neighbor* and *bi-linear* interpolation. 1+2+2=5

3. (a) What do you mean by *adjacency* of pixels? With the help of an example, define 4-, 8- and m-*adjacency*. 1+2=3
(b) For the following image segment, compute the lengths of the shortest 4-, 8- and m-path between the pixels p and q, where v={0, 1}. If a particular path does not exist between p and q, explain why. 3+1=4

3	1	2	1(q)
2	2	0	2
1	2	1	1
(p)1	0	1	2

4. (a) What is a *mask* in spatial filtering? How do you perform negative, log transform and power-law transform of a digital image? 1+2=3
(b) What do you mean by *contrast stretching*? Give an application of *contrast stretching*. 1+2=3
(c) Discuss *histogram equalization* and *histogram matching*. What benefits do you have for *histogram matching* over *histogram equalization*? 3+1=4

5. (a) What is *salt-and-pepper* noise? Which type of filtering technique is the most appropriate for reducing such noise? 2
(b) What do you mean by the derivative of a digital image? Describe the operation of *Robert's Cross Gradient* and *Sobel's* operators for calculating image derivative? 1+3=4

- (c) Suppose a 3-bit image (8 different intensity levels from 0 to 7) of size 64x64 pixels (total 4096 pixels) has the intensity distribution as shown in the below table. Perform histogram equalization on this image and find out the histogram equalized intensity values and also draw the equalized histogram.

r_k	n_k
$r_0 = 0$	790
$r_1 = 1$	1023
$r_2 = 2$	850
$r_3 = 3$	656
$r_4 = 4$	329
$r_5 = 5$	245
$r_6 = 6$	122
$r_7 = 7$	81

6. (a) What is *morphological image processing*? Define set reflection and set translation 1+2=3
- (b) Define *opening* and *closing* of an image. What effects do opening and closing bring to an image? 1+2=3
- (c) Describe the process of shape detection based on morphological operations. 4
7. (a) Why opening by reconstruction is preferable to morphological opening of an image? 2
- (b) What do you mean by *hole* in a digital image? Describe the process of hole filling based on morphological reconstruction. 1+3=4
- (c) Discuss the following operations on a gray-scale image. 4
- i) Erosion ii) Dilation

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B.Sc. (Engg.) 4th Year 2nd Semester Final Examination – 2012 (Session: 2008–09)

Course Code: CSE 4206 Course Title: Simulation and Modeling

Marks: 50

Time: 03:00 hrs.

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is simulation? When simulation is the appropriate tool? 2
(b) What is activity network? How it can be used to model a project? 4
(c) Discuss the pros and cons of simulation. 4
2. (a) What are the applications of pseudo-random numbers? 2
(b) What are the desirable properties of good random number generators? 4
(c) Discuss the mid-square method of generating pseudo-random numbers and also mention its drawbacks. 4
3. (a) What is seed of a random number generator? 2
(b) Describe Linear Congruential Generators (LCG). 4
(c) What are the available methods for testing pseudo-random number generators? Explain any one of them. 4
4. (a) What is topological ordering of a list of activities from a project? Given a topological ordered activity network consisting of 7 activities and 5 nodes and their starting time $S(k)$, finishing time $F(k)$, duration $T(k)$ of K 'th activity. Calculate $ENT(5)$, the earliest time to achieve the sink node, which is the time required to complete the project. 10

Activity No., K	S(k)	F(k)	T(k)
1	1	2	5.1
2	1	3	7.2
3	2	4	6.0
4	2	3	4.5
5	3	5	15.8
6	3	4	0
7	4	5	2.5

5. (a) Extract from the following discussion the **entities**, **attributes** and **activities** of the system: 10
Ships arrive at port. They dock at berth if one is available. Otherwise, They wait until one becomes available. They are unloaded by one of several work gangs whose size depends upon ship's tonnage. A warehouse contains a new cargo for the ship. The ship loaded and then departs. Suggest two exogenous events (other than arrivals) that may need to be taken into account.
6. (a) What is SIMSCRIPT? What is its importance? 2
(b) How will you organize the SIMSCRIPT program? 4



- (c) Write a C function that will return an empirically distributed random value corresponding to the random variable X in (d). You may assume that a function randval() that return uniform(0, 1) exists.
- (d) Describe the Kendall notation for queues.

2

2

2

4

4

7. (a) Briefly explain geometric construction of deterministic self-similar fractals.
- (b) Write short note on Bezier Curves and Surfaces.
- (c) What are the steps in designing an animation sequences? Briefly explain each of them.

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B.Sc. (Engg.) 4th Year 2nd Semester Final Examination – 2012 (Session: 2008–09)
Course Code: CSE 4208 Course Title: VLSI Design
Marks: 50 Time: 03:00 hrs.

(Answer any Five. Figures in the right margin indicate full marks.)

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| 1. (a) Describe in brief the evolution of logic complexity in IC. | 2 |
| (b) State Moore's law. Write down the benefit of monolithic integrating circuit. | $1+2=3$ |
| (c) Explain the POS and SOP with example. | 5 |
| 2. (a) Define custom and semi-custom design styles. How can choose of particular design style for a VLSI product. | 4 |
| (b) Explain the VLSI design flow with proper diagram. | 6 |
| 3. (a) Explain different VLSI design styles. | 6 |
| (b) Describe in brief about the CAD technology for VLSI chip design. | 4 |
| 4. (a) Explain the VLSI layout design rule. | 5 |
| (b) What are the basic steps in VLSI fabrication process flow? | 5 |
| 5. (a) Discuss the various regions of operation of an n-MOS transistor | 10 |
| 6. (a) Deduce an expression of depletion layer charge density of MOS transistor under external bias. | 5 |
| (b) Explain in brief about the current voltage characteristics of MOS transistor. | 5 |
| 7. (a) Define threshold voltage of MOSFET. | 1 |
| (b) Deduce an expression for threshold voltage of MOSFET. | 6 |
| (c) Calculate the threshold voltage V_{JO} at $VB = 0$, for a polysilicon gate n-channel MOS transistor, with the following parameters: substrate doping density $N_A = 10^{16} \text{ cm}^{-3}$, polysilicon gate doping density $ND = 2 \times 10^{20} \text{ cm}^{-3}$, gate oxide thickness $t_{ox} = 500\text{\AA}$, and oxide-interface fixed charge density $N_{ox} = 4 \times 10^{10} \text{ cm}^{-2}$. | 3 |

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Course Code: **CHM 1224** Course Title: **Chemistry**

Marks: **50**

Time: **03:00 hrs.**

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) The nucleus of an atom is positively charged. Justify the statement. 4
(b) Show that energy increases as the electron moves away from the nucleus. 4.5
(c) What is Stark effect? 1.5
2. (a) What is photoelectric effect? Derive Einstein photoelectric effect equation. 1+3=4
(b) What modifications were proposed by Summerfield in Bohr's atomic model. 4
(c) State and explain Hund's rule of multiplicity. 2
3. (a) What is modern periodic law? How it is superior of Mendeleef's periodic table. 1+3=4
(b) What is quantum number? Find out the value of four quantum numbers of 15th electron of Cl. 3
(c) Write Schrödinger wave equation and mention the term in. 1.5
(e) What is Eigen function and Eigen value? 1.5
4. (a) What is lattice energy? Derive Born-Lande equation for the calculation of lattice energy. 1+4=5
(b) Draw and explain the structures of PCl₅ and XeF₂ on the basis of VSEPR theory. 1.5×2=3
(c) Draw the Molecular orbital diagram for O₂⁻ and predict its magnetic behavior. 2
5. (a) State the laws of thermodynamics. 3
(b) Establish the expression for isothermal reversible expansion of an ideal gas and show that the work done in this process is the maximum. 4
(c) Define the following terms: (i) Internal energy; (ii) Enthalpy; (iii) Entropy. 1×3=3
6. (a) What do you know about electrochemical cell and E.M.F. 3
(b) Give some applications of the E.M.F. measurements. 4
(c) What are the relation between solubility and solubility product constant? 3
7. (a) Why do real gases not obey the ideal gas equation? 3
(b) Deduce Vander Waal's equation for n mole of a real gas. 4
(d) Discuss the critical conditions for the liquefaction of gases. 3

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Course Code: **GEN 3221**

Course Title: **Bangladesh Studies**

Marks: **50**

Time: **03:00 hrs.**

(Answer any Five. Figures in the right margin indicate full marks.)

1. Describe the different stages of Liberation War of Bangladesh in 1971. 10
2. What do you mean constitution? Explain the main features of constitution of Bangladesh in 1972. 10
3. Define development. What is the present position of Bangladesh for establishing Millennium Development Goals (MDGs)? Explain. 10
4. What do you mean by independence of judiciary? Discuss the factors upon which the independence of the judiciary depends in modern democratic states. 10
5. Discuss the relationship between population and development in the context of Bangladesh. 10
6. Write short notes on any of two.
 - a) 6-point program of 1966
 - b) Executive of Bangladesh
 - c) Mujibnagar Government of 197110
7. Analyze the political significance of Bangladesh and India relationship. 10

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Course Code: SOC 2223 Course Title: Sociology

Marks: 50

Time: 03:00 hrs.

(Answer any Five. Figures in the right margin indicate full marks.)

1. Define Sociology. Discuss the subject matter of Sociology. 10
2. What do you mean by scientific method? What are the steps usually used to conduct a sociological research by scientific method? Discuss. 10
3. What is meant by social structure? What are the different elements of social structure? Discuss with specific examples. 10
4. What does globalization mean? What are the changes that globalization brought in the contemporary age. Site examples from your own society. 10
5. What do you mean by social stratification? How many social stratification systems are found in human history? Discuss with their own characteristics. 10
6. Discuss the causes and effects of social disorganization. 10
7. Define social change. Briefly discuss the existing theories of social change. What theory according to you is most appropriate in explaining social change? 10

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Course Code: **PHY 1125**

Course Title: **Physics**

Marks: **50**

Time: **03:00 hrs.**

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is working function? Is it correct to say that the maximum photoelectron KE_{max} is proportional to the frequency ν of the incident light? If not, what would a correct statement of the relationship between KE_{max} and ν be? 1+2=3
(b) Define Compton effect. Show that 1+6=7
$$\lambda' - \lambda = \frac{h}{mc} (1 - \cos \varphi),$$
 where the symbols have their usual meaning.
2. (a) What is the binding energy? 2
(b) Calculate the binding energy per nucleon is ${}^6\text{C}^{12}$. 3
(c) Using the radioactive decay law drive the decay equation. 5
3. (a) Define miller indices. 2
(b) Explain the face-centered cubic (fcc) structure of the atom. 2
(c) Draw the planes in a cubic crystal having faces (100), (110), (111), (211), (101) and (001). 6
4. (a) Explain why Gauss' law is necessary in place of Coulomb's law? 2
(b) State and prove Gauss' law of electrostatic. 5
(c) Show that Coulomb's law can be derived from Gauss' law. 3
5. (a) Briefly discuss the various lattice defects in crystal. 4
(b) Find the electric field due to a long straight uniform charged wire. 6
6. (a) Define (i) Alpha decay; (ii) Beta decay. 2
(b) Discuss the essential requisites of a thermometer. 5
(c) What are the main postulates of the kinetic theory of gasses? 3
7. (a) What are the coherent sources? 2
(b) Write down the conditions for interference of light. For Young's double-slit experiment, find out the conditions for bright and dark fringes. 1+4=5
(c) Green light of wavelength 5100Å from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200cm away is 2cm. Find the slit separation. 3