Software Engineering (Model Question)

Course Title: Software Engineering
Course No: CSC364
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any TWO questions. (2 × 10 = 20)

1. Explain the different software life cycle models and compare them with advantages and disadvantages.
2. In the software development process, how does software configuration management facilitate the changes that may occur during different stages of a software development life cycle? Justify your explanation with example.
3. Differentiate between functional and non-functional requirements. What are the various types of functional and non-function requirements that are placed on the system? Explain with example.

Section B

Attempt any EIGHT questions. (8 × 5 = 40)

4. Differentiate between software engineering and computer science?
5. Differentiate between V-shape model and spiral model.
6. What is software quality assurance? Explain with example.
7. Differentiate between Validation and Verification.
8. Explain the component base software engineering and its advantages.
9. What are the drawbacks of software reuse? Explain.
10. Differentiate between structural models and behavioral models.
11. Discuss COCOMO model in cost estimation of the software in detail.
12. Explain maintenance process in detail.

Compiler Design and Construction (Model Question)

Course Title: Compiler Design and Construction **Full Marks:** 60
Course No: CSC365 **Pass Marks:** 24
Semester: VI **Time:** 3 Hrs.

Section A

Attempt any TWO questions. (2 × 10 = 20)

1. Differentiate between top-down and bottom-up parsing methods. Construct SLR parse table for the following grammar.

   S->aETe
   E->Ebc
   E->b
   T->d

2. What are static and dynamic type checking? Write SDD to carry out type checking for the following expression.

   E->id |E1 op E2 | E1 relop E2 | E1[E2] | E1↑

3. What is the role of intermediate code generation in the entire compilation process? Convert the following into three address code.

   a+(b-c)*d

Section B

Attempt any EIGHT questions. (8 × 5 = 40)

4. Define compiler. Explain analysis phase of compiler.
5. "Symbol table is a necessary component of compiler", justify this statement with examples.
6. Given a regular expression (ε + 0)*10. Construct the DFA recognizing the pattern described by this regular expression using syntax tree based reduction.
7. Define the terms token, pattern and lexeme. How input buffer can be used for scanner. Explain.
8. Find first and follow of all the non terminals in the following grammar.

   E → TA ; A→+TA|ε ; T→FB ; B→*FB | ε ; F→(E) | id

9. What is Syntax Directed Definition? Define synthesized and inherited attributes with example.
10. What do you mean by runtime storage allocation? Differentiate static and dynamic allocation.
11. Why is it necessary to optimize code? Explain any two code optimization techniques with example.
12. Explain about the factors affecting code generation.

E-Governance (Model Question)

Course Title: E-Governance
Course No: CSC366
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any TWO questions. (2 × 10 = 20)

1. Define e-governance business model. Explain wider dissemination and critical flow model of e-governance in detail. (2 + 8)
2. Why do we need e-governance infrastructure? Explain network infrastructure, computing infrastructure and data centres for e-governance. (3 + 7)
3. What are the challenges to e-governance security? Explain e-governance security model in detail. (3 + 7)

Section B

Attempt any EIGHT questions. (8 × 5 = 40)

4. What are different benefits of using e-governance? Explain. (5)
5. Explain online service delivery with example. (5)
6. How can we achieve good governance through e-governance models? Explain. (5)
7. What is e-readiness? Explain human infrastructure preparedness for e-governance. (2 + 3)
8. What is e-governance security standard? Why do we need such standards? (2 + 3)
9. What is national data warehouse? What is census data? (2 + 3)
10. How can we use data warehousing and data mining in agricultural sector in Nepal? (5)
11. Explain concept of smart nagarpalika? What is cyber law? (4 + 1)
12. Write short notes on: (2 × 2.5 = 5)
    a. Cloud governance
    b. E-governance security architecture

NET Centric Computing (Model Question)

Course Title: NET Centric Computing
Course No: CSC367
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any TWO questions. (2 × 10 = 20)

1. Describe the MVC pattern. Create class to showcase constructor, properties, indexers and encapsulation behavior of object oriented language.
2. Explain the architecture and design principles of .NET. Create methods to insert, update, delete and read all data for the table Student having following fields StudentId(int), Name varchar(200), RollNo (int), Class varchar(50) using Entity Framework.
3. How does the system manage state in stateless HTTP? Design a page to show client side validation for login page using jquery or angular or react.

Section B

Attempt any IGHT questions. (8 × 5 = 40)

4. Write an application showing sql injection vulnerability and prevention using ado.net.
5. How do you host and deploy the ASP.NET core application.
6. Describe the process of adding authentication to apps and identify service configurations.
7. Differentiate between class, sealed class and interface. What is the task of Object Relational Mapper?
8. Explain the process of compiling and executing .NET application.
9. Why do we need generics? What are the significances of MSIL?
10. Express the format of request and response message format. What is the role of adapter class in database connection?
11. How do you render HTML with views? Explain.
12. Write short notes on (Any TWO)
    a. Single page application
    b. Hidden fields
    c. Await patterns

Technical Writing (Model Question)

Course Title: Technical Writing
Course No: CSC368
Semester: VI

Full Marks: 80
Pass Marks: 32
Time: 3 Hrs.

Section A

Attempt any THREE questions. (3 × 10 = 30)

1. What is technical writing? Distinguish between technical writing and academic writing.
2. As writing is not an overnight endeavor it follows a certain process. Discuss a process for technical writing.
3. What is ethics? How do an ethical dilemma and a legal dilemma differ? Discuss with examples.
4. What are graphics? How are they used in technical writing?

Section B

Attempt any TEN questions. (10 × 5 = 50)

5. Write a short report describing the writing skills a computer network administrator requires.
6. Write a letter to your employer requesting a two-day leave for a special event, such as brother or sister's wedding.
7. You are calling a client to set up an interview about a new type of Internet system in his or her office. What arrangements should you discuss with him or her? Make a list of at least three areas you need to cover in the phone call to set up an interview.
8. Write an email encouraging your staff to work for some additional hours every week so that the company and staff equally benefit.
9. Write a brief newspaper article explaining the importance of training for the staff of a company.
10. Based on your experience, write instructions for new students, explaining how to register for classes or for a particular program.
11. Write a functional resume highlighting your skills for a job in your field.
12. Considering audience and purpose, write a short speech you are going to deliver in the inaugural session of the College IT Fair.
13. Suggesting an action or a program, write a recommendation report to your ward office so that the entire environment of your community significantly improves.
14. Write a brief proposal on a problem you have been facing as a student of your college.
15. Imagine you are the manager of a company. You need to inform your staff that a new product is being launched on the occasion of New Year. Prepare a memo so that your staff understand and execute your plan.

Applied Logic (Model Question)

Course Title: Applied Logic
Course No: CSC369
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any TWO questions. (2 × 10 = 20)

1. Arrange following arguments in standard order, write down their mood and figure, identify their validity by using Venn diagram and finally if the argument is invalid identify the syllogistic rule violated by the argument.
    a) All persons who plan ahead are people who live in the future, all persons who worry are people who live in the future, therefore all persons who plan ahead are persons who worry.
    b) Some self-actualized persons are not procrastinators because some procrastinators are lazy persons and no self-actualized persons are lazy persons
2. Translate the following arguments into symbolic form and then their formal proof of validity by using the suggested symbols
    a) If Tarun or Neelam had come to college, the project will be finished, and the principle would have been pleased. Had the principle been pleased, all the teachers would have been commended. But all teachers were not commended. Therefore Tarun did not come to college. {T, N, F, P, C}
    b) No geese are felines. Some birds are geese. Therefore, some birds are not felines. {G, F, B}
3. What is casual reasoning? Explain mills methods of reasoning with suitable examples.

Section B

Attempt any EIGHT questions. (8 × 5 = 40)

4. Discuss the need and procedure of paraphrasing a complex passage. And paraphrase the given passage: *"If an action promotes the best interest of everyone concerned & violates no one's right, then that action is morally acceptable. In an act, at least some cases, active euthanasia promotes the best interest of everyone concerned and violates no one's right. Therefore, in at least some cases active euthanasia is morally acceptable."*

5. When a term is said to be distributed or undisturbed? Describe distribution of terms with suitable examples.
6. Describe traditional square of oppositions with suitable examples.
7. Prove invalidity of the following argument:

   $A \supset B$

   $C \supset D$

   $\underline{A \vee D}$

   $B \vee C$

8. What is fallacy? Identify the type of fallacy committed in the arguments given below with explanations.
   a. I believe in the Bible because it is the written word of God through his prophets. Obviously, God would not lie to his prophets. After all, the Bible says so.
   b. During the Gulf war many Americans made immense profits. That is an indisputable fact. Therefore, there can be no doubt that American business interests instigated the war.
9. Define categorical proposition and its quality and quantity with examples.
10. How can you express categorical propositions using quantifiers? Explain with examples.
11. How can you use analogy to claim validity and invalidity of inductive arguments? And what factors do you consider while evaluating analogical arguments? Describe briefly.
12. Translate the following sentences into standard categorical propositions
    a) Whoever is a child is silly
    b) All swans are not white
    c) Nothing ventured, nothing gained
    d) Brave people are people who deserve the fair are
    e) It is not uncommon for a musician to have perfect pitch

Model Question (E-Commerce)

Course Title: E-Commerce
Course No: CSC370
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any two questions. (2 × 10 = 20)

1. Describe the various security mechanisms used to secure ecommerce systems. [10]
2. What is Secured Electronic Transaction (SET) Protocol? Describe how purchase request, payment authorization and payment capture are done in SET? [2 + 8]
3. Consider a company is planning to establish a B2B e-commerce system. Now describe in detail about the possible types of B2B Business Models the company can adapt. [10]

Section B

Attempt any eight questions. (8 × 5 = 40)

4. What is e-commerce? How it differs from e-business? [2.5+2.5]
5. How the features like ubiquity, information density and richness make e-commerce better than traditional commerce. Justify with examples.[5]
6. Describe the possible types of revenues models that can be adapted in e-commerce systems.[5]
7. What is e-payment? Describe the working mechanism of online credit card transaction.[1+4]
8. What is a shopping cart in an e-commerce application? How can you build shopping carts? [1+4]
9. Discuss the possible security threats in e-commerce systems. [5]
10. How linear, non-linear, in-banner and in-text video ads are used for digital marketing? [5]
11. Describe how promoted tweets, promoted trends and lead generation cards are used as Twitter marketing tools? [5]
12. Consider you are given a role of SEO analyst to perform search engine optimization analysis of www.sastodeal.com, what kind of SEO activities you will perform so as to improve rank of the website. [5]

Automation and Robotics (Model Question)

Course Title: Automation and Robotics
Course No: CSC371
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any two questions. (2 × 10 = 20)

1. Where can the concept of pneumatic drive be used? Derive the equation of HP of motor. (4+6)
2. Explain different path planning approaches in detail. (10)
3. Differentiate between mechanical gripper, magnetic gripper and suction/vacuum gripper. What are the factors that should be considered while selecting and designing grippers? Derive the required magnitude of the gripper force. (3+3+4)

Section B

Attempt any eight questions. (8 × 5 = 40)

4. State Asimov's laws of robotics. Explain major components of robotics. (2+3)
5. Describe machine vision with necessary figures. (5)
6. Determine a transformation 'T' matrix that represents a rotation of 'α' angle about the OX axis followed by a translation of 'b' units along the rotated OV axis. (5)
7. Differentiate between pneumatic and electronic force control respectively. List their advantages and disadvantages. (2+3)
8. How can hill climbing techniques be implemented in robotics? What are its limitations.(3+2)
9. How process control tuning can be achieved? (5)
10. Highlight on the challenges of robot cell design. (5)
11. How inverse kinematics problem can be solved. Explain with necessary figures and equations. (5)
12. Write short notes on: (2 × 2.5 = 5)
    a. Robot programming languages
    b. Power wall

Neural Networks (Model Question)

Course Title: Neural Networks
Course No: CSC372
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any two questions. (2 × 10 = 20)

1. Differentiate between small scale and large scale learning problems. How can heuristic be implemented for making back propagation algorithm perform better? (4+6)
2. State Cover's theorem on separability of problems. Explain hybrid learning technique for RBF network. (3+7)
3. What is vanishing gradient problem in recurrent networks? How can it be solved? Explain with necessary equations. (4+6)

Section B

Attempt any eight questions. (8 × 5 = 40)

4. Define neural network. Briefly explain the working mechanism of biological neural with its related functional units (1+4)
5. What is a perceptron? Explain batch perceptron algorithm. (1+4)
6. Highlight on minimum-description length principle. Explain instrumental-variables method. (1+4)
7. Explain LMS algorithm. How does it differ from wiener filter.(4+1)
8. What are the properties of feature map? Explain Kernel Self-Organizing map.(1+4)
9. What is universal approximation theorem? How can real-time recurrent learning be achieved.(1+4)
10. Explain hybrid learning concept in RBF networks (5)
11. Differentiate between batch learning and on-line learning. How is learning rate controlled by using optimal annealing? Explain the concept of network pruning. (1+2+2)
12. Write short notes on: (2 × 2.5 = 5)
    a. Convolutional networks
    b. cross validation

Computer Hardware Design (Model Question)

Course Title: Computer Hardware Design
Course No: CSC373
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any two questions. (2 × 10 = 20)

1. Write MIPS assembly code for the following function where n corresponds to the argument register $a0? (10)

```
int fact (int n)
{
    if (n < 1)
            return (1);
    else
            return (n * fact(n – 1));
}
```

2. What are different pipelining hazards? Highlight on the techniques that can be implemented to reduce these hazards. (5+5)
3. Explain different associative structures for an eight-block cache. Assuming a cache of 4K blocks, a 4-word block size, and a 32bit address, find the total number of sets and the total number of tag bits for caches that are direct mapped, two-way and four-way set associative, and fully associative. (5+5)

Section B

Attempt any eight questions. (8 × 5 = 40)

4. A program runs in 20 seconds on computer A, which has a 2 GHz clock. We are trying to help a computer designer build a computer, B, which will run this program in 12 seconds. The designer has determined that a substantial increase in the clock rate is possible, but this increase will affect the rest of the CPU design, causing computer B to require 1.4 times as many clock cycles as computer A for this program. What clock rate should the designer target? (5)
5. Explain how TLB, virtual machine and cache can be integrated? (5)
6. Briefly explain different MIPS addressing modes. (5)
7. Explain x86 floating point architecture. (5)
8. What are different pipelining hazards and explain techniques to reduce them.(5)
9. How can FSM be implemented for a simple cache controller? (5)
10. Suppose we have a benchmark that executes in 150 seconds of elapsed time, of which 120 seconds is CPU time and the rest is I/O time. Suppose the number of processors doubles every two years, but the processors remain the same speed, and I/O time doesn't improve. Calculate the improvement in CPU performance. (5)
    a) After eight years
    b) In elapsed time
11. Explain different approaches of hardware multithreading. (5)
12. Write short notes on: (2 × 2.5 = 5)
    a. Roofline model
    b. Power wall

Cognitive Science (Model Question)

Course Title: Cognitive Science
Course No: CSC374
Semester: VI

Full Marks: 60
Pass Marks: 24
Time: 3 Hrs.

Section A

Attempt any two questions. (2 × 10 = 20)

1. What is mind body problem? Discuss about the Pinker, Penerose and Searle's response to mind body problem [3+7]
2. What is physical symbol system? Illustrate with example. Discuss about the Fodor's argument for language of thought hypothesis. [4+6]
3. What is visuospatial attention? Mention the hypotheses about visuospatial attention. Describe about the standard and radical simulations of mind reading. [2+3+5]

Section B

Attempt any eight questions. (8 × 5 = 40)

4. Discuss Marr's three level of computation. Support your answer with example. [5]
5. Describe cognition, cognitive psychology and cognitive science. [5]
6. What is Cognitive Model of Memory? Describe about the Atkinson-Shiffrin's Model. [1+4]
7. Describe the Chinese room argument. Justify whether Chinese room problem passes Turing Test? [3+2]
8. How goal based agent are different from simple reflex agents? [5]
9. Discuss about the ACT-R/PM cognitive architecture. [5]
10. How mapping of the brain's electrical activity is done with EEG and MEG? [5]
11. Describe the Baron-Cohen's Model of mind reading system. [5]
12. What is neural network? Describe about the multilayer neural network. [2+3]