Date of showing evaluated answer books: 25 .06.2022

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Roll No. 1901040411

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B. Tech (CSE / IT)

END SEMESTER EXAMINATION

EVEN SEMESTER (VI), 2021-22

ECS-360: INTERNET OF THINGS

Time: 2:30 Hours **Max. Marks: 50**

Note: 1. Attempt all questions. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

1. Understand framework and architecture of Internet of Things. (Understand)
2. Understand key technologies in Internet of Things. (Understand)
3. Explain wireless sensor network architecture and its framework along with WSN applications. (Understand)
4. Explain resource management in the Internet of Things. (Understand)
5. Understand Security measures and design applications based on Internet of Things. (Understand, Apply)

		Related Course Outcome (CO)	Marks
Q. No. 1:	Attempts all parts of the following:		
(a)	What are the major challenges for IOT system Designing? Explain components of IOT.	01	05
(b)	What do you mean by IOT communication model? Explain the Publish-Subscribe model for IOT in detail.	01	2.5
(C)	Write Notes on following protocols (i) 802.11 Wifi (ii) UDP (iii) CoAP	01	2.5
Q. No.2:	Attempts all parts of the following:		
(a)	What do you mean by smart objects? Explain different communication pattern used for smart objects.	02	05
(b)	What are key criteria to choose a Sensor? Differentiate between active and passive sensors.	02	05
Q. No. 3:	Attempts all parts of the following:		
(a)	Explain the operational principal of Radio Frequency Identification Technology (RFID) with help of suitable block diagram.	03	05
(b)	Elaborate the Layered Architecture of wireless sensor network with help of structure.	03	2.5
(c)	Describe the four applications of wireless sensor networks in detail. (OR) Discuss the issues in designing of wireless sensor networks in detail.	03	2.5

Q. No. 4: Attempts all parts of the following:

(a) Explain the clustering principle of internet of things with the help of two layered IOT framework. **04** **05**

(b) With the help of a diagram discuss the software agent for object representation. What are the many types of software agents available? **04** **05**

Q. No. 5: Attempts all parts of the following:

(a) What are the IOT security issues? Explain the security architecture for IOT with suitable diagram. **05** **05**

(b) Discuss the security component in detail and what are the main goals of security? **05** **05**

(OR)

What do you mean by Business model for IOT? Discuss any business model for IOT in detail

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HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B-TECH

End Semester Examination

Even Semester (VI), 2021-22

ECS-358: Soft Computing

Time: 2:30 Hours **Max. Marks: 50**

Note: 1. Attempt all questions. All questions carry marks, as shown against them.

1. Understand differential behavior of Human and Intelligent Systems.
2. Understand and use supervised and un-supervised learning techniques in ANN.
3. Understand and apply different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Network and their combination.
4. Correlate human- like processing in problem solving with current technologies in various domains like Bio Informatics, Multimedia Systems, Big Data Analytics, etc.
5. Apply evolutionary computing techniques in real life problems.

		Course Outcome (CO)	Marks
Q. No. 1:	Attempt both questions.		
(a)	What do you understand by intelligent systems? Explain its characteristic behavior.	CO1	(05)
(b)	What do you understand by soft computing? Differentiate between Hard and Soft Computing.	CO1	(05)
Q. No.2:	Attempt both questions.		
(a)	Differentiate between Single layer perceptron and multilayer perceptron method.	CO2	(05)
(b)	Write the algorithm for back propagation training and explain about the updation of weights.	CO2	(05)
Q. No. 3:	Attempt both questions.		
(a)	Define Hebb's Learning rule for competitive Learning. What are its uses? OR Explain the concept of Kohonen's self- organizing map (SOM) with its applications.	CO3	(05)
(b)	Explain the concept of Adaptive Resonance Theory.	CO3	(05)
Q. No. 4:	Attempt both questions.		
(a)	Explain the concept of fuzzy inference systems with example.	CO3	(05)
(b)	Explain the different methods of Defuzzification.	CO3	(05)
Q. No. 5:	Attempt both questions.		
(a)	What is Genetic Algorithm? Draw its general flow diagrams of genetic Algorithms.	CO4	(05)

(b) Write short notes on: CO5 **(05)**

i. Fitness Function

ii. Rank Selection

OR

Explain the use of evolutionary computing in image processing, information retrieval, computer vision and semantic web.

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HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B. Tech.

End Semester Examination

Even Semester (VI), 2021-22

ECS-362: NETWORK SECURITY

Time: 2.30 Hours **Max. Marks: 50**

Note: 1. Attempt all questions. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

1. Understand and deploy cryptographic techniques to secure data in networks. (Understand, Apply)
2. Analyze the vulnerabilities in any computing system and design a security solution. (Apply, Analyse)
3. Understand and use standard algorithms for confidentiality, integrity and authenticity. (Understand, Apply)
4. Apply various key distribution and management schemes in network system. (Apply)
5. Apply security protocols in various IT applications. (Apply)

		Related Course Outcome (CO)	Marks
Q. No. 1:	Attempt all parts of the following:		
(a)	What services are being offered under network security? Differentiate the following pairs: (i) Brute Force Search and Cryptanalysis (ii) Known plaintext attack and chosen plaintext attack	1	**(05)**
(b)	Write down the algorithm for S-DES encryption and decryption. Explain the role of S-Boxes in S-DES algorithm.	1	**(05)**
Q. No.2:	Attempt all parts of the following:		
(a)	Perform encryption and decryption using RSA algorithm for the following: p=17, q=7, e=5, n=119, message M=6. Here p, q, e and M have usual meanings. Show all the steps of calculations. Write down the steps involved in encryption and decryption in RSA algorithm.	2	**(05)**
(b)	Describe Fermat's and Euler's Theorems with their applications.	2	**(2.5)**
(c)	Explain distribution of public-key using public-key certificate scheme.	2	**(2.5)**

Or

In Diffie-Hellman key exchange algorithm, let prime numbers be 11 and 7. Let A and B select their secret keys $X_A = 3$ and $X_B = 6$ to exchange secret key between two communicating parties. Compute

(i) Public keys of A and B

(ii) Common secret key

Q. No. 3: Attempt all parts of the following:

(a) Enlist security services provided by digital signature. Write the DSS (digital signature standard) scheme of digital signature generation and verification. Prove the correctness of the verifying process. 3 **(05)**

(b) Describe secure hash algorithm (SHA) using suitable example. Differentiate MAC (Message Authentication Code) and secure hash algorithms (SHA). 3 **(05)**

Q. No. 4: Attempt all parts of the following:

(a) What are major security aspects in the security of electronic mail system? Explain the working of PGP (Pretty Good Privacy). 4 **(05)**

(b) What requirements are defined for Kerberos? Explain the duties of each server. Write the sequence of message exchanges that happens when a client attempts to obtain a service granting ticket in Kerberos 4. 4 **(05)**

Q. No. 5: Attempt all parts of the following:

(a) Explain the requirements of Security Association (SA) in IP Sec. How Authentication Header (AH) is used in transport and tunnel modes in IP Sec protocol? 5 **(05)**

(b) Enlist the various components of Web Security. What are the various services are being offered by secure socket layer (SSL)? 5 **(2.5)**

(c) What do you mean by web security threats and its mitigation? 5 **(2.5)**

Or

Write down the role and working of Secure socket layer (SSL) in web security.

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HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

End Semester Examination

Even Semester (IIIrd B.Tech.), 2021-22

HHS 352: Entrepreneurship Development

Time: 2:30 Hours **Max. Marks: 50**

Note: *1. Attempt all questions.*

2. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

1. Describe what it takes an Entrepreneur; describe multiple ways to become an entrepreneur; including, intrapreneur, and manager, woman entrepreneur rural & urban: highlights motives to become entrepreneur.
2. Apply the beginner concept, ownership and various forms with focus on small scale enterprises.
3. Identify opportunities using identification; project conceptualization, formulation & evaluation.
4. Identify potential contribution of human resources, marketing, financial and strategic management with fund, opportunities
5. Decipher the role of Institution support and policy framework of Government for enterprises in India.

	Related CO	Marks
Q.No. 1: Attempt any **two** of the followings. (a) Who is an entrepreneur? Discuss the main characteristics of an entrepreneur. (b) Discuss rural entrepreneurship; suggest some schemes that support rural entrepreneurship. (c) Enumerate the different objectives of EDP in detail.	CO1	5*2=10
Q.No. 2: Attempt any **two** of the followings. (a) Define MSMEs. Elucidate Role of Govt.in developing MSMEs. (b) Distinguish between long term & short term source of finance? (c) What is the process of company formation? Explain.	CO2	5*2=10
Q.No. 3: Attempt any **two** of the followings. (a) What is project formulation? Explain its Significance in developing project. (b) Give a specimen of a project report for any industry. (c) What is a project? Explain various phases of project management.	CO3	5*2=10
Q.No. 4: Attempt any **two** of the followings. (a) Explain marketing mix with suitable example. (b) Discuss the process of strategy formulation. Explain main strategies for business growth. (c) What is human resource management and explain its functions.	CO4	5*2=10
Q.No. 5: Attempt any **two** of the followings. (a) Discuss the Institutional framework to promote small scale industry in India. (b) What are the different functions of a TCO? Explain in detail. (c) Who is a venture capitalist? What is the need of venture capital in startups?	CO5	5*2=10

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HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

III B. Tech. CS/IT End Semester Examination

Even Semester (VI), 2021-22

ECS-357: Compiler Design

Time: 2:30 Hours **Max. Marks: 50**

Note:- *1. Attempt all questions.*
2. All questions carry marks as shown against them.

Course Outcomes (CO)

1. Describe the role of each phase of a compiler with its construction tools. (Understand)
2. Develop a Lexical Analyzer for recognizing tokens of a given language with an understanding of symbol table management and error handling. (Apply)
3. Construct top-down, bottom-up, operator precedence and SLR parsers with an understanding of Context Free Grammars and syntax analysis. (Understand ,Apply)
4. Design and develop semantic analyzers for type-checking and intermediate code generators to translate the source program into an intermediate code. (Apply)
5. Construct code optimizers to optimize the target code generated. (Apply)

Q. No.	Question	CO	Marks
1.	**Attempt all subparts of this question.**		
(a)	Describe how various phases could be combined as a pass in a compiler?	CO1	(05)
(b)	Write short notes on following : (i) Lexical analyzer (ii) Boot Strapping	CO1	(05)
2.	**Attempt all subparts of this question.**		
(a)	How a grammar can be termed as ambiguous? Determine whether the following grammar is ambiguous or not $S \rightarrow a\ S\ b\ S \mid b\ S\ a\ S \mid \varepsilon$	CO2	(05)
(b)	What do you mean by Tokens? How many tokens are present in the following expression? int num ; printf (" i = %d, &i = %x", i , &i) ;	CO2	(05)
3.	**Attempt all subparts of this question.**		
(a)	*Construct predictive* parsing table for the following grammar $E \rightarrow T\ E'$ $E' \rightarrow +\ T\ E' \mid \varepsilon$ $T \rightarrow F\ T'$ $T' \rightarrow *\ F\ T' \mid \varepsilon$ $F \rightarrow id \mid (E)$	CO3	(05)

(b)	Construct a SLR(1) parsing table for following grammar $S \rightarrow (L) \mid a$ $L \rightarrow L+S \mid S$ **OR** Explain whether the following grammar is LALR(1) grammar or not $S \rightarrow Aa \mid bAc \mid dc \mid bda$ $A \rightarrow a$	CO3	(05)
4.	**Attempt all subparts of this question.**		
(a)	What is an activation record? Explain how it is related with run time storage organization?	CO4	(05)
(b)	What do you mean by intermediate code generation? Explain Quadruples, triples and indirect triples.	CO4	(05)
5.	**Attempt all subparts of this question.**		
(a)	Explain in detail about Loop optimization techniques with proper examples.	CO5	(05)
(b)	How a leader is determined in a basic block? Draw a flow graph of the following code. 1. $a = 10$ 2. $b = 15$ 3. $a = a + b$ 4. $b = a - b$ 5. $a = a - b$ 6. if ($a == b$) goto (3)	CO5	(05)

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HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

3rd (CSE + IT)

VIth Semester (Even) Examination 2021-22

ECS-356: Computer Graphics

Time: 2:30 Hours **Max. Marks: 50**

Note: Attempt all questions. All questions carry marks, as shown against them.

Course Outcomes (CO) in statement form:

1. Understand and use various mathematical concepts and supporting composite 2-D & 3-D graphics transformations for hidden surface detection/ removal and various graphical algorithms. (Understand, Apply) 2. Design algorithms for various graphics shapes like ellipse, hyperbola, triangle etc. (Apply)
3. Use of various graphical tools and software in 3D Graphics API (e.g. OpenGL or DirectX). (Apply)
4. Understand and apply geometrical transformation and computer graphics in multidisciplinary field of engineering. (Apply)
5. Understand the hardware system architecture for computer graphics - graphics pipeline, frame buffers, and graphic accelerators/co-processors. (Understand)

		Related Course Outcome (CO)	Marks
Q. No. 1:	Attempt All the Questions.		
(a)	Explain the architecture of simple random scan display system. What are the merits and demerits of random scan display system?	CO1	**(05)**
(b)	Derive midpoint circle algorithm.	CO1	**(05)**
Q.No.2:	Attempt All the Questions.		
(a)	i. Derive the window to viewport transformation and elaborate. ii. Explain the Sutherland- Hodgeman Polygon- Clipping algorithm OR Describe the Midpoint subdivision algorithm	CO2	**(2.5)** **(2.5)**
(b)	Use the Cohen-Sutherland outcode algorithm to clip two lines P_1 (40,15) – P_2 (75,45) and P_3 (70,20) – P_4 (100,10) against a window A(50,10), B(80,10), C(80,40), D(50,40)	CO2	**(05)**
Q. No. 3:	Attempt All the Questions.		
(a)	Show how reflection in the line y = x and in the line y = -x can be performed by a scaling operation followed by a rotation?	CO3	**(05)**
(b)	Give the mathematical description for the perspective projection.	CO3	**(05)**

Q. No. 4: Attempt All the Questions.

(a)	Give the mathematical description of Bezier curve with respect to blending function. Explain the properties of Bezier curves	CO4	**(05)**
(b)	Explain the Z-buffer algorithm for hidden surface removal. List the advantages and disadvantages of Z-buffer algorithm.	CO4	**(05)**

Q. No. 5: Attempt All the Questions.

(a)	Explain diffuse reflection and Specular reflection. Give the illumination model that incorporate these reflections.	CO5	**(05)**
(b)	Write short notes on the followings:	CO5	**(2.5)**
	i) Multimedia		**(2.5)**
	ii) Animation		

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HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B. Tech. (CSE / IT)

End Semester Examination

Even Semester (IV), 2021-22

ECS-354: Object Oriented Systems

Time: 2:30 Hours **Max. Marks: 50**

Note: 1. Attempt all questions. All questions carry marks, as shown against them.

2. Q.No.6 is from the lab component of the subject.

Course Outcomes (CO):

1. Analyse information systems in real-world settings and use an object-oriented method for analysis and design. (Analyse)
2. Understand features of object-oriented design such as encapsulation, polymorphism, inheritance, and UML. (Understand)
3. Understand and prepare different types of UML diagrams like use case diagrams, interaction diagrams, nested state diagrams, state chart diagrams, activity diagram etc. (Understand, Apply)
4. Understand and appreciate the use of Design Patterns in the Software Development. (Understand, Apply)
5. Understand the core and advance Java Programming features and apply them in complex problem solving. (Understand, Apply)

		Related CO	Marks
Q. No. 1	Attempt ALL subparts of this question.		
(a)	What is Unified Process? How it came to its present form? Brief the notations and symbols used in UML diagrams. Give its comparative advantages and disadvantages.	CO1, CO2	4
(b)	Compare and contrast the Object oriented approach with traditional approach of software development. Also, discuss the software engineering models suitable for these two approaches of software development.	CO1, CO2	4
Q. No. 2	Attempt ALL subparts of this question.		
(a)	A Bank offers two kinds of accounts to its customers that they can make withdrawals from, deposit funds into and enquire as to the current balance. The first is an ordinary account and the second is a current account. Both have an account number and hold the current balance. However, Current Account has an overdraft limit that is normally agreed with Bank Manager when the Account is created. Withdrawals can be made up to the overdraft limit. There is no overdraft limit available for the ordinary accounts. Clearly, there is no limit on deposits that can be made in either case. Construct a Class diagram for the Bank Account.	CO1, CO3	4

(b)	Differentiate between Aggregation and Generalization relationships in Classes and objects diagrams. Give an example where both relations coexist in a class diagram.	CO1, CO3	4
Q. No. 3	Attempt ALL subparts of this question.		
(a)	What are the advantages of nested states diagrams over flat states diagrams? Prepare States Diagram for functioning of Traffic Control System for a Crossroad in a Smart City.	CO2, CO3	4
(b)	Explain the concepts of activity, action, guarded transition, automatic transition in States diagrams using suitable example(s).	CO2, CO3	4
Q. No. 4	Attempt ALL subparts of this question.		
(a)	Discuss the importance of use case diagrams in Unified Process. Draw Use Case diagram for Library management System.	CO4	4
(b)	What are the benefits of using Component Diagrams? How dependencies are shown in Component Diagrams? Discuss various types of dependencies in Component diagrams with the help of suitable examples.	CO3	4
Q. No. 5	Attempt ALL subparts of this question.		
(a)	What are Design patterns in UML? How they are useful? Explain the Composite or Adapter design patterns with a suitable example.	CO5	4
(b)	Discuss how Object Oriented technologies have been useful in web services?	CO5	4
Q. No. 6	(Laboratory Component): Attempt ALL subparts of this question		
(a)	Describe the life cycle of an applet. Develop an applet that receives three numeric values from the user and displays the largest of the three on the screen. Write a HTML page that embeds this applet.	CO5	5
(b)	What is a thread? How do threads behave in Java? Write a program in Java showing the action from three threads using a suitable example OR What are the various approaches to connect Java programs to a database? Explain any one approach in details with the help of a suitable example.	CO5	5