CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR
(Deemed to be University)
KOKRAJHAR :: BTR :: ASSAM :: 783370

END – SEMESTER EXAMINATION
UG

Session: **Janu-June, 2023** Semester: **VI** Time: **3Hrs.** Full Marks: **100**
Course Code: **UCSE601** Course Title: **Compiler Design**

Answer question no 1 and any *four* from the rest

1. Answer all the questions:
a) Lexical analyser is related to (regular expression, context free grammar, type checking, left-most derivation) .....
b) The number of token in the C-statement ***printf("Hello World");*** is .....
c) The grammar $S \rightarrow a/ab/abc$ is [LL (1), LL (2), LL (3)] .....
d) The regular expression for the language L = { w $\in$ (0, 1) *: |w| is even} .....
e) The most powerful parser is (CLR, SLR, LALR) .....
f) The bottom-up parsing is also known as (Shift-reduce, Predictive, Recursive descent) .....
g) Write the three address code for $x = a[i][j]$
h) Give an example of semantic error.
i) In order to calculate x^n, the minimum number of multiplication is .....
j) What are the different ways to express three address codes?

2 x 10

2. (a) Remove left recursion from the following grammar:

$$A \rightarrow ABd|Aa|a,\ B \rightarrow Bc|b$$

(b) Calculate the First and Follow for the given grammar:

$$S \rightarrow ACB|CbB|Ba,\ A \rightarrow da|BC,\ B \rightarrow g|\epsilon,\ C \rightarrow h|\epsilon$$

c) Write quadruples for the expression:

$$(a * b) + (c + d) - (a + b + c + d)$$

6 + 10 + 4

3. a) Consider the following grammar:

$$S \rightarrow S,\ S \rightarrow SS|a|\epsilon$$

i) Construct the collection of sets of LR(0) items for this grammar and draw its go to graph.
ii) Indicate the shift-reduce and reduce-reduce conflict (if any) in the various state of the LR(0) parser.
b) Define ambiguous grammar. Check whether the grammar is ambiguous or not? Justify your answer.

$$S \rightarrow aBC,\ A \rightarrow bC|cd,\ C \rightarrow cd, B \rightarrow c|d$$

15 + 5

4. (a) Find the basic blocks and construct the Flow Graph of the following piece of Three Address Code:

1. location = -1
2. i = 0
3. if i<100 goto 5
4. goto 13
5. t1 = 4*i
6. t2 = A[t1]
7. if t2 == x goto 9
8. goto 10
9. location = i
10. t3 = i+1
11. i = t3
12. goto 3
13. return

b) construct the LL(1) parsing table of the following grammar

$$S \rightarrow iEtSS'|a,\ S' \rightarrow eS|\epsilon,\ E \rightarrow b$$

10 + 10

5. (a) Consider the following grammar productions and the corresponding semantic rules:

Production	Semantic Rule
E → TR	E.val = R.val , R.inh = T.val
R → ϵ	R.val = R.inh
R → +E	R.val = R.inh + E.val
T → FS	T.val = S.val, S.inh = F.val
S → ϵ	S.val = S.inh
S → *T	S.val = S.inh * T.val
F → n	F.val = n.val
F → (E)	F.val = E.val

Use this to evaluate the expression 3*5. Display the annotated parse tree and order of evaluation of the variable attributes.
(b) The lexical analyzer uses the given patterns for recognizing three tokens, T_1, T_2, and T_3, over the alphabets $\{a, b, c\}$.

$$T_1 : a?(b|c)^*a$$
$$T_2 : b?(a|c)^*b$$
$$T_3 : c?(b|a)^*c.$$

Note: 'x?' means 1 or 0 occurrences of the symbol x. Also, the analyzer outputs the token matching the longest possible prefix. If the analyzer processes the string *bbaacabc*, find the sequence of tokens it outputs.

10 + 10

6. Write the short note on (any two)
a) Peephole optimization
b) Lex and Yacc
c) Target Code Generation

10 + 10

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2023

SUBJECT NAME: Professional Communication

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a. Illustrate the differences of the following: 4x2=8

   (i) Nonverbal communication and verbal communication

   (ii) Lateral communication and diagonal communication

   b. What are the advantages and limitations of audio visual aids. 6

   c. What are the key elements that constitute the structure of a press release? Mention them chronologically. 6

2. a. What is the difference between a tagline and a slogan? Give examples of emotive and persuasive slogans. Write two slogans each on conserving natural resources and recycling. 2+4+4=10

   b. What is advertising? What are the essential features of advertising? 4+6=10

3. a. How can minutes of a meeting make the meeting more efficient? 6

   b. Prepare a basic outline of the key components to be considered while preparing the minutes of a meeting. 8

   c. "A lack of cultural understanding can create a barrier for business success". Give examples to overcome cultural barriers at the workplace. 6

4. a. Write short notes on any five: 2x5=10

   (i) Oculesics (ii) Haptics (iii) Vocalics (iv) Artifacts (v) Physical appearance (vi) CC and BCC in email writing

b. Explain briefly any five measures to overcome socio-psychological communication barriers. 2x5=10

5. a. Write about some fundamentals of soft skills in workplace. 10

b. Write about the significance of a Team Work. 10

6. a. "Your Resume needs to stand out in the crowd". Explain. 10

b. Discuss in brief the main parts of a proposal. 10

7. Write short notes on any four of the following 5x4=20

(i) Interpersonal Skills (ii) Emotional Quotient (iii) Presentation Skills (iv) Stress Management (v) Report Writing (vi) Technical Writing

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Machine Learning

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

Q1. Consider the following dataset of *Old Car Sell* and develop a Linear Regression Model. Compute the R^2 value of your model. What will be the predicted price of an 8 years old car?

Car Age (Years)	Price (Rs in Lacs)
10	1
1	5
3	4
5	3
6	4

(12+5+3)

Q2. Consider the following dataset of three classes of flower. Apply K means clustering algorithm to identify their corresponding cluster. What will be the problem if you have a flower having petal length = 50 cm and petal width = 100 cm in the following dataset.

Petal Length(cm)	Petal Width (cm)
1	1
10	9
10	14
12	13
2	1
2	2
5	6
4	6
5	5
11	12

(16+4)

Q3.

(a) Consider the average number of COVID positive cases in your city was 5000/day. After the vaccination drive the number of cases over the last twelve days are as follows -

6000, 2000, 3000, 1500, 7000, 500, 1000, 500, 2000, 1000, 5000, 3000.

Based on the above mentioned data can we conclude that the vaccination drive has decreased the number of cases. Consider a 5% significance level of testing. Critical value t (11, 0.05) = 1.796.

(b) Consider the following execution time of five different program codes (*P1, P2, P3, P4, P5*) in three different machines (*M1, M2, M3*). Use ANOVA test to check whether the performance of these machines are statistically significant with a 5% significance level.

	M1	M2	M3
P1	5	3	6
P2	4	7	5
P3	8	2	10
P4	5	4	7
P5	9	3	8

F table

Critical values of F for the 0.05 significance level:

	1	2	3	4	5	6
1	161.45	199.50	215.71	224.58	230.16	233.99
2	18.51	19.00	19.16	19.25	19.30	19.33
3	10.13	9.55	9.28	9.12	9.01	8.94
4	7.71	6.94	6.59	6.39	6.26	6.16
5	6.61	5.79	5.41	5.19	5.05	4.95
6	5.99	5.14	4.76	4.53	4.39	4.28
7	5.59	4.74	4.35	4.12	3.97	3.87
8	5.32	4.46	4.07	3.84	3.69	3.58
9	5.12	4.26	3.86	3.63	3.48	3.37
10	4.97	4.10	3.71	3.48	3.33	3.22

(5+15)

Q4. Consider the following (Input: A, B, Output: X, Y) and design a suitable ANN. Clearly mention the total number of parameters and their corresponding values.

Input	Input	Output	Output
0	0	0	1
0	1	1	0
1	0	1	0
1	1	0	0

(20)

Q5. Consider the following dataset (P, Q are inputs and S is output) and design a SVM based model for binary classification.

P	Q	S
1	1	-1
-1	2	-1
1	-1	+1
-2	-2	+1

(20)

Q6. Write short notes on

(a) Kernels of SVM
(b) Overfitting and underfitting
(c) Logistic regression
(d) K nearest neighbour

(20)

Total number of printed pages 2: Programme (UG)/Semester (VI)/UCSE602

2023

Software Engineering

Full Marks : 100

Time : Three Hours

The figures in the margin indicate full marks for the questions.

Answer question no. 1 (Compulsory) and any four (4) from the rest.

1.

a. Define the following terms in brief: **2*5=10**

i) Software Life Cycle ii) Software Engineering iii) DFD
iv) Data dictionary v) Design document

b. Differentiate between the followings: **2*5=10**

i) Phase Entry and Phase Exit Criteria

ii) Alpha Testing and Beta Testing

iii) Structured Analysis and Structured Chart

iv) Function Oriented Design and Object Oriented Design

v) Unit Testing and System Testing

2. **5*4=20**

a. What will happen if software engineering process is not followed properly?

b. Discuss the two software engineering techniques: Abstraction and Decomposition.

c. Why classical waterfall model is not a choice of the modern software developers?

d. Which lifecycle model is known as Meta model and why?

3.

a. What is SRS? Discuss functional and non-functional requirement. 5

b. Explain five desirable characteristics of a good software requirement specification. 5

c. Write down the functional requirements of an SRS document for an ATM (Automated Teller Machine). **10**

4.

a. Define Cohesion and Coupling. Explain different types of Cohesion and Coupling. 2+8= 10

b. Explain the characteristics of good software design. 5

c. "Software design is a layered technology", justify it. 5

5.

a. What is a Prototype Model? Mention the important advantage of it? Discuss the model with a suitable diagram. 2+2+6=10

b. Discuss the job responsibilities for managing software projects in details. 4

c. Assume that the size of an organic type software product has been estimated to be 32,000 lines of code. Assume that the average salary of a software developer is Rs. 15,000 per month. Determine the effort required to develop the software product, the nominal development time, and cost to develop the product. 6

6. a. What do you mean by generic and customized software? 4

b. On what basis, an appropriate life cycle model is selected for a project? 3

c. A customer number (CN) is provided to the customers by a super market. The super market intends to provide special award to top 10 customers who make the highest purchase over the year. Moreover, a gold coin of worth RS. 3000.00 will be provided to them whose annual purchase is more than RS. 15000.00. Draw the context diagram, 1st level DFD and 2nd level DFD for the same. 2+4+4=10

d. Mention the problems an analyst need to identify in the requirement analysis. 3

7. Write a short note on any four 5x4=20

a. Activity diagram

b. Intermediate COCOMO model

c. Evolutionary model

d. Software crisis

e. Delphi Cost estimation Technique

f. Project Planning

g. Critical Path Method