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Paper Code: TIT 402/TCS 410

TMC 401 /TMI 403

End Semester Examination 2018

MCA / M.Sc (IT) / B.Tech(IT/EC) IV Semester

Data Structure using 'C' language.

Time: Three Hours

MM: 100

Note:

- (i) This question paper contains two sections.
- (ii) Both sections are compulsory.

Section – A

Q1.

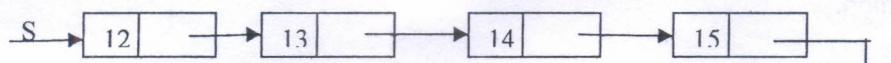
(1X 5 = 5 Marks)

A) Write a postfix form of a following expression:

$$A * B / C + D / E$$

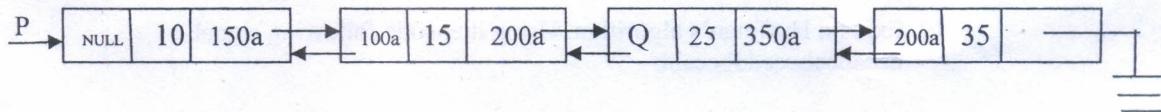
b) The following sequence of operations is performed on stack:

- Push (1), Push (2), POP, Push(60), Push(50), POP, POP, POP, PUSH(70), POP
 What will be the sequence of values popped out from the stack?

c) Write steps to insert a node between 2nd and 3rd node in following linked list. First node of list is pointed by a pointer S.

d) What do you understand by sparse matrix?

e) What is the value of P and Q in following doubly linked list



Q2. Attempt any five parts out of seven.

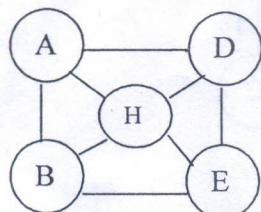
(3 X 5 = 15 Marks)

a) Convert the following infix expression into postfix expression.

$$(a+b * c) + ((d * e + f) * g)$$

b) Write a C function to count number nodes in a singly linked list. First node of that linked list is pointed by a pointer P.

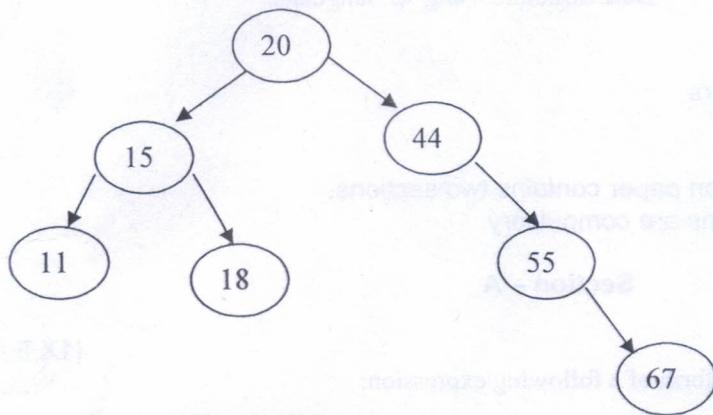
c) Give memory representation of following graph.



d) Consider a Stack pointed by a pointer top. Write a C function to print stack from Bottom to top.

e) Write a short note on Overflow and Underflow in linked list.

f) Perform right threading on following binary search tree.



g) Draw an expression tree from following expression:

$$S = X/Y^3 * 4\%Z + W^2$$

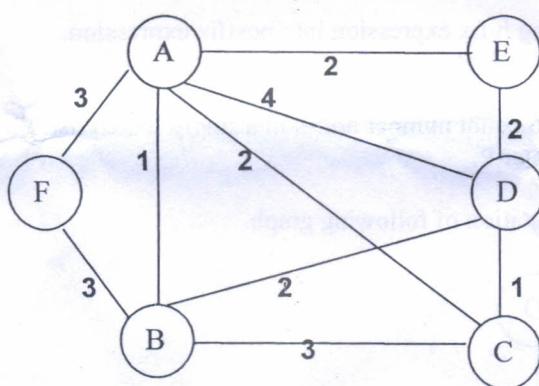
Section - B

Each question contains three parts a, b & c. Attempt any two parts of choice from each question.

Q3.

(10X 2 = 20 Marks)

- Write a C function to create a singly linked list by inserting nodes at left side and then write a function to print all those nodes having odd information of the linked list.
- Explain Huffman's algorithm. Using it encode following signal.
eeeabbabcccdedbccabb
- Given the following connected graph, extract the Minimum Spanning Tree using Kruskal's Algorithm. Show the intermediate steps.

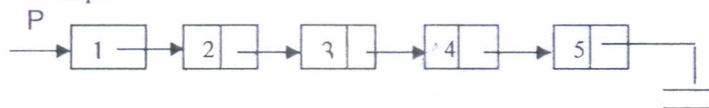


Q4.

(10X 2 = 20 Marks)

- a) Consider a singly linked list, pointed by a pointer P. Write 'C' function to delete all alternative nodes from that linked.

Example:



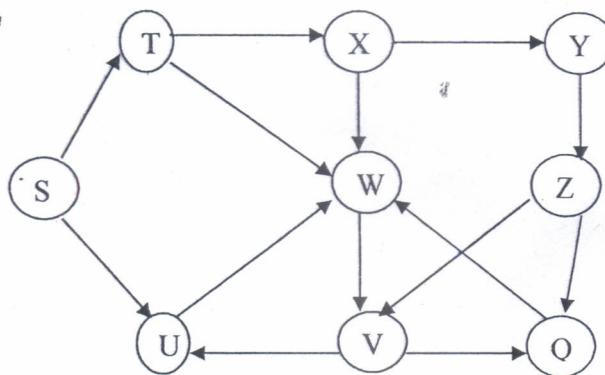
- b) Arrange the given numbers in ascending order using merge sort. Show all steps.
19, 106, 999, 16, 101, 990, 115, 199, 110, 809

- c) Explain B and B⁺ tree. Draw a B tree of order 3 with following keys
13, 4, 5, 6, 1, 2, 11, 21, 12, 7, 3, 16.

Q5.

(10X 2 = 20 Marks)

- a) Write name and apply a graph traversal technique to find a path from S to O so that in between there are minimum number of nodes.



- b) Explain followings with examples
(i) Division Method (ii) Multiplication Method (iii) Folding method (iv) Mid square Method.
c) Write a 'C' function to create a doubly linked by inserting node in such a manner that linked list remains in ascending (using double pointer).

Q6. (10X 2 = 20 Marks)

- a) Explain index sequential file organization and relative file organization.

- b) Explain any two hash collision removal techniques with examples.

- c) Write a 'C' function to insert node in a binary search tree also write a 'C' function to count all those nodes having right child.

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**M. C. A. (FOURTH SEMESTER)
END SEMESTER EXAMINATION, 2018**

COMPUTER GRAPHICS AND ANIMATION

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. State True/False : (1×5=5 Marks)

(a) The initial value of decision parameter of Bresenham's line algorithm is $p = 2.dx - dy$. (True/False)

(b) The reflection image of the point (10, 5) about the line $y = x$ is (10, -10). (True/False)

(c) A point (10, 0) is rotated about origin through an angle 45 degree in clockwise direction, the new position of the point will be (0, 10). (True/False)

- (d) The Bezier curves always passes through the first and last control point.

(True/False)

- (e) The flood fill algorithm is applicable if the boundary of polygon is in multiple colours.
(True/False)

2. Attempt any five parts : (3×5=15 Marks)

- (a) Write a short note on aliasing and anti-aliasing.
- (b) Give the DDA line generating algorithm for ($m < 1$) in left to right movement.
- (c) Discuss Painter's algorithms.
- (d) Discuss the Shearing. Find the transformation equations for shearing about both the axes in 2-dimension.
- (e) If $R(\theta)$ is the rotation operator about origin, then show that :

$$R_1(\theta) \cdot R_2(\theta) = R(\theta_1 + \theta_2) = R_2(\theta) \cdot R_1(\theta)$$

- (f) Write a short note on Cubic Bezier Surface.

- (g) How long would it take to load a 1024×1280 frame buffer with 12 bit per pixel, if 10^3 bits can transfer per second ?

Section—B

3. Attempt any two parts of choice from (a), (b) and (c). (10×2=20 Marks)

- (a) Digitize circle $x^2 + y^2 = 144$ in octant ($45^\circ \leq \theta \leq 90^\circ$) using Bresenham's circle generating algorithm, Plot points on Cartesian graph.
- (b) Digitize line from (10, 8) to (20, 17) using Bresenham's line algorithm, plot points on Cartesian graph.
- (c) Discuss Cyrus-Beck line clipping algorithm.

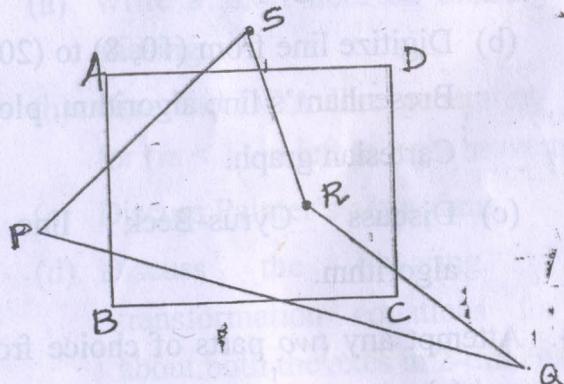
4. Attempt any two parts of choice from (a), (b) and (c). (10×2=20 Marks)

- (a) Discuss the scan line polygon fill algorithm.
- (b) Find the reflection of the triangle P (2, 5), Q (5, 9) and R (8, 11) about the line $y = x + 1$.
- (c) Write down a procedure for Flood fill algorithms using 4 connected.

5. Attempt any two parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$

(a) Why is elimination of hidden-surface required? Give Z-buffer algorithm.

(b) Use the Sutherland-Hodgman polygon clipping algorithm to clip the polygon against the window shown in figure :

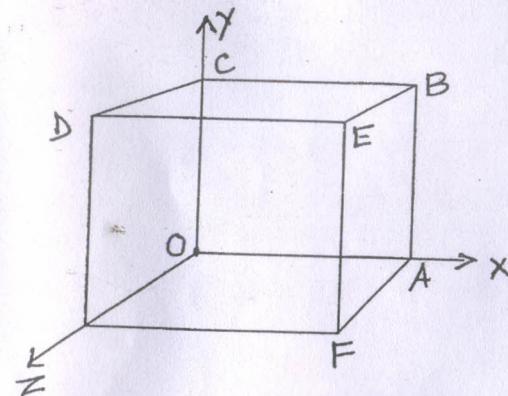


(c) Determine six point on the Bezier curve with equidistant parametric value, having control points $(x_0, y_0) = (50, 180)$, $(x_1, y_1) = (250, 100)$, $(x_2, y_2) = (600, 300)$ and $(x_3, y_3) = (500, 50)$ distributed over a screen of resolution 640×350 .

6. Attempt any two parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$

(a) What is Morphing? Discuss a morphing technique.

(b) The unit cube shown in figure is projected on to the XY plane. What will be its Cavalier projection when $\phi = 30^\circ$?



- (c) Write short notes on the following :
- Fractals
 - Animation softwares

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END SEMESTER EXAMINATION, 2018**

NETWORK SECURITY AND
CRYPTOGRAPHY

Time : Three Hours

Maximum Marks : 100

- Note :** (i) This question paper contains two Sections.
(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks : (1×5=5 Marks)
 - (a) Multiplicative inverse of 3 in Z_{15} is _____.
 - (b) To hide the relationship between plaintext and ciphertext is known as _____.
 - (c) Round key generator used in DES takes _____ bit cipher key and generates _____ bit key for each round.
 - (d) Output of $\phi(36)$ is _____.
 - (e) In RSA _____ key is kept secret and _____ key is distributed.

2. Attempt any *five* parts : (3×5=15 Marks)
- Explain Snooping and Masquerading.
 - Explain S-DES Round key generator.
 - Explain DES Round Function.
 - Explain P-Boxes.
 - Define CAPTCHA.
 - Explain Viruses.
 - Explain concept of SHA-512.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Differentiate Active and Passive attacks with its types.
 - Write and explain : Electronic Code book, Cipher Block Chaining and Cipher Feedback.
 - Encrypt and decrypt the message "BALLOONS ARE BLACK AND WHITE" using Playfair cipher, where key is MONALISA.
4. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Explain the Encryption process of BLOWFISH Algorithm with its complete structure.

- Explain the concept of IDEA Algorithm with its Key Generation Process.
 - Explain the RC-5 algorithm with its structure.
5. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Explain the concept of Public Key Cryptography. Write and explain the RSA algorithm.
 - Write and explain the MD-5 algorithm.
 - What Protocols are used for e-Mail security ? Explain any *one*.
6. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Write and explain Secure Socket Layer and Transport Layer Security in detail.
 - What is Kerberos ? What servers are involved in Kerberos Authentication ? Explain.
 - Explain the following terms :
Signature-based IDS, Anomaly-based IDS, Passwords, Biometrics.

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M. C. A. (FOURTH SEMESTER) END SEMESTER EXAMINATION, 2018

COMPILER CONSTRUCTION

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Write True-False : (1×5=5 Marks)
 - (a) The regular language is subset of context free language. (True/False)
 - (b) An ambiguous Context Free Grammar (G) can be processed by LALR (1) parser. (True/False)
 - (c) Three-address code is used by syntax analyzer. (True/False)
 - (d) YAAC is a tool, which is used by compiler to generate an object code. (True/False)
 - (e) Constant folding is a technique, which is used in peephole optimization. (True/False)

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2. Attempt any *five* parts : $(3 \times 5 = 15 \text{ Marks})$
 (Define/Short Numerical/Short Programming/Draw)
- Draw transition diagram to represent real number.
 - Write a short note on syntax and semantic analysis phase of the compilation.
 - Write a short note on panic mode and statement mode of error recovery technique.
 - What is regular expression ? Also, explain how they are useful in lexical analysis.
 - Describe structure of a lex program. Also, write lex program that recognize identifiers.
 - Write and explain steps to eliminate left recursion from Context Free Grammar.
 - Find the associativity and precedence of the terminals +, * and & for the grammar G having production rules as given below :
- $$\begin{aligned} E &\rightarrow E + B \mid B \\ B &\rightarrow B * F \mid F \\ F &\rightarrow F \& G \mid G \\ G &\rightarrow g \mid f \end{aligned}$$

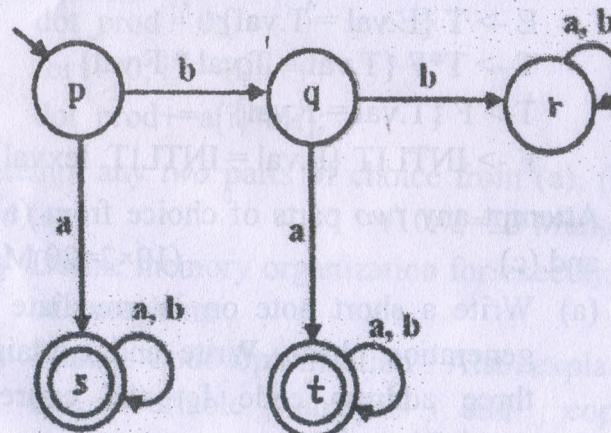
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(d) (e) (f) next page
 (g) (h) (i) Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$

- For the grammar G (NT, T, P, E) where the set of production P : $E \rightarrow E + E \mid E - E \mid E * E \mid id$, show the ambiguity in grammar for the strings $id + id - id$ and $id * id + id$.
 - Calculate LL(1) parsing table for the following grammar G :
- $$P : S \rightarrow (S) / \epsilon$$
- Write a LEX program to implement the following deterministic finite automata :



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4. Attempt any two parts of choice from (a), (b) and (c). (10 \times 2=20 Marks)

- (a) Write and explain algorithm of Recursive Descent Parser (RDP) for the grammar G with the following productions :

$$P : \quad S \rightarrow ABC$$

$$A \rightarrow a \mid b$$

$$B \rightarrow a \mid \epsilon$$

$$C \rightarrow b$$

- (b) Write and explain the algorithm for "Operator Precedence Parser".

- (c) Define a Syntax Directed Translation (SDT). Also, explain Synthesized and Inherited attributes. What will be the output of Syntax Directed Translation (SDT) for the string "3 + 4 * 6" and the following semantic rules ?

$$E \rightarrow E + T \{E.val = E.val + T.val\}$$

$$E \rightarrow T \{E.val = T.val\}$$

$$T \rightarrow T * F \{T.val = T.val * F.val\}$$

$$T \rightarrow F \{T.val = F.val\}$$

$$F \rightarrow INTLIT \{F.val = INTLIT.lexval\}$$

5. Attempt any two parts of choice from (a), (b) and (c). (10 \times 2=20 Marks)

- (a) Write a short note on intermediate code generation phase. Write and explain the three address code for the expression $a + b * c + d$.

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- (b) Write steps of SLR (1) parsing algorithm to parse the string " $i + i + i'$ " for the following parse table :

	Action			GoTo	
	i	$+$	$\$$	E	T
0	S3			1	2
1			ACCEPT		
2		S4	R2		
3		R3	R3		
4	S3			5	2
5			R1		

- (c) Write a three-address code for the following :

```
int a[10], b[10], dot_prod,i;
dot_prod = 0;
for (i=0; i <=10;i++)
    dot_prod+=a[i]*b[i];
```

6. Attempt any two parts of choice from (a), (b) and (c). (10 \times 2=20 Marks)

- (a) Define memory organization for execution of a program.

- (b) What is Code Optimization ? Also, explain live variable analysis and copy propagation.

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P. T. O.

- (c) Define Procedure Activation Record.
Draw and define an activation record for
the following procedures :

```
main(){  
    Int n;  
    readarray();  
    quicksort(1, n);  
}
```

```
quicksort(int m, int n){
```

```
    int item;  
    intarr[5];  
}
```

- (d) (a) Explain the steps for the insertion
(and removal) of a particular node in
a linked list containing pointers.

- (b) Write a C program to implement
linked list. Define the following
operations:

MCA
End Semester Examination 2018
IV Semester

Paper Name: Software Engineering

Time: Three Hours

MM: 100

Note:

- (i) This question paper contains two sections.
- (ii) Both sections are compulsory.

Section – A

Q1. Choose the correct answer:

(1X 5 = 5 Marks)

- i. Which is not a software characteristic:
 - a) Software does not wear out
 - b) Software is always correct
 - c) Software is flexible
 - d) Software is not manufactured
- ii. Which of the following is not a software:
 - a) System Software
 - b) Application Software
 - c) Programming Software
 - d) Function Point Software
- iii. Not a phase of SEI-CMM model:
 - a) Initial Level
 - b) Management Level
 - c) Repeatable Level
 - d) Optimized Level
- iv. Software should be logically partitioned into smaller elements, which are known as:
 - a) Parts
 - b) Structures
 - c) Modules
 - d) Abstraction
- v. What are the components of a decision table
 - a) condition stub
 - b) Action stub
 - c) Condition entry
 - d) All

Q2. Attempt any five parts out of seven.

(3 X 5 = 15 Marks)

- a) Define Software Engineering as per IEEE.
- b) Explain Software Requirement Specification.
- c) What are Benefits of the RAD model?
- d) Explain BASIC COCOMO Cost Estimation Model.
- e) Describe Structured Walk Through Process?
- f) Describe Software Testing Life Cycle Model.
- g) Describe Software Re-engineering Process.

Section – B

Each question contains three parts a, b & c. Attempt any two parts of choice from each question.

Q3.

(10X 2 = 20 Marks)

- a. "We cannot apply same scale of development for small and large software". Is it true? Explain with your logic.
- b. Explain the software engineering Challenges in detail.
- c. Explain Strong Cohesion and Weak Coupling is the desired property of a good software design.

Q4.

(10X 2 = 20 Marks)

- a. What are the advantages and disadvantages of Prototype model? In what terms incremental model (INM) is different from other Models?
- b. Describe Black-box and white-box Testing and explain at least one technique of both testing.
- c. Describe role and responsibilities of software tester and challenges faced by him/her?

Q5.

(10X 2 = 20 Marks)

- a. Explain the Verification and validation process in software development and software testing?
- b. What is McCabe's Cyclomatic Complexity? Define and describe how Cyclomatic Complexity is calculated, illustrate with suitable example.
- c. Explain the terms Regression Testing, Integration Testing and User Acceptance Testing

Q6.

(10X 2 = 20 Marks)

- a. Explain CASE tools, with their relevance and importance in Software Development
- b. Explain the SEI capability maturity model. How is it different from ISO?
- c. Explain Reverse Engineering, Debugging, Software maintenance and Software Metrics.