

NAME :

Roll No.:

**UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**END SEMESTER EXAMINATION (2018) MTH-S201**

M.M.-50

**B.TECH.2<sup>nd</sup> YEAR (CSE - Branch) Regular**

TIME-3:00 Hrs.

**Section-A**

- ✓ 1. Find the analytic function  $f(z)$  whose real part is  $3x^2y - y^3$ . 3
2. Expand the function  $f(z) = \cos z$  as Taylor or Laurent series in the complex plane. 3
- ✓ 3. Evaluate  $\int_0^{1+i} (x - y + ix^2) dz$  along the straight line from  $z = 0$  to  $z = 1 + i$ . 3
- \* 4. Find the Fourier series expansion of  $1 - x^2$  in  $-1 < x < 1$ . 3
5. Solve  $(D^3 - D^2 D' + DD'^2)z = 2 \sin(3x + 2y)$  3
6. Find the Fourier sine transform of  $e^{-|x|}$ . 3

**Section- B**

7. State and prove Cauchy Integral Formula. 4
- ✓ 8. Evaluate  $\oint_C \frac{2z-1}{z(z+1)(z-3)} dz$ , where  $C$  is the circle  $|z|=2$ . 4
9. Evaluate by residue theorem  $\int_0^\infty \frac{dx}{(a^2 + x^2)^2}$ . 4
10. Expand the function as a Fourier series  $f(x) = x \sin x$  in the interval  $-\pi < x < \pi$ . 4
11. Develop  $\sin(\frac{\pi x}{l})$  in the half range cosine series in the range  $0 < x < l$ . 4
12. Find the Fourier transform of  $f(x) = \begin{cases} 1-x^2 & |x| < 1 \\ 0 & |x| > 1 \end{cases}$  and use it to evaluate  $\int_0^\infty \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx$ . 4
- ✓ 13. Solve the partial differential equation  $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ . 4
14. Solve  $(D^2 + DD' - 6D'^2)z = x^2 \sin(x+y)$  4

Best of luck



# UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY KANPUR

End Semester Examination (Dec. 2018)

Subject Name: Engineering Mechanics

Subject code: ESC-S201

Branch – Computer Science

Time: 3hrs.

Marks: 50

Instructions:

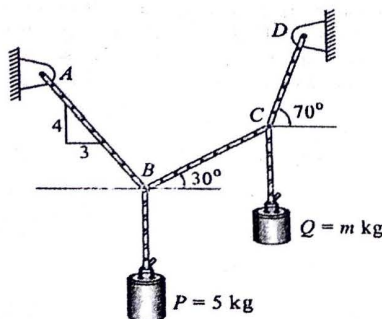
- ✓ Attempt all the questions.
- ✓ Read the questions carefully and write to the point answers.
- ✓ Assume any data if required and mention the same.

## Section A

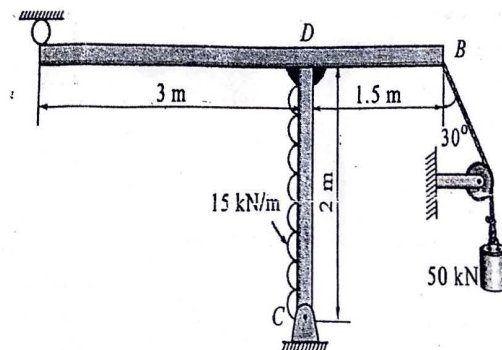
- ✓ 1 Block  $P=5\text{kg}$  and block  $Q$  mass  $m$  kg is suspended through the cord is in equilibrium position as shown in fig. 1. Determine the mass of block  $Q$ . 5
- 2 Bars  $AB$  and  $CD$  are rigidly connected by welding at  $D$  as shown in fig. 2. Bar  $AB$  weights  $5\text{kN/m}$  Where weight of bar  $CD$  negligible. Determine the support reactions. 5
- 3 Calculate the Moment of inertia of circle about its diametral axis. 5
- ✓ 4 A ball is dropped from the top of tower  $35\text{ m}$  high. At the same instant a second ball is thrown upward from the ground with an initial velocity  $20\text{m/s}$ . When and where do they cross and with what relative velocity 5

## Section B

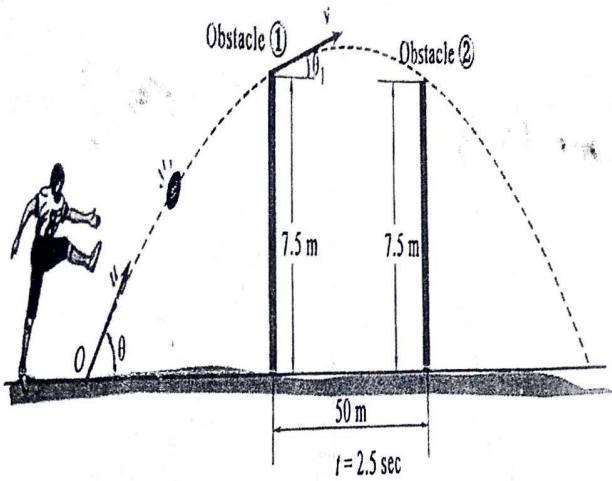
- ✗ 5 An object is projected so that it must clear two obstacles each  $7.5\text{ m}$  high which are situated  $50\text{m}$  from each other as shown in fig.3. If the time of passing between the obstacles  $2.5\text{sec}$ , calculate the complete range of projection and velocity of projection. 7
- ✓ 6 Determine the centroid of shaded area as shown in fig. 4. Also the Moment Of inertia about the  $x-x$  axis of shaded area. 8
- 7 Two block  $W_1$  and  $W_2$  which are connected by a horizontal bar  $AB$  are supported on rough planes as shown in fig. 5. The coefficient of friction for block  $A=0.4$  and .The angle of friction for block  $B$   $20^\circ$ . Find the smallest weight  $W_1$  of the block  $A$  for which the equilibrium can exist, if  $W_2 = 2250\text{N}$  7
- ✓ 8 Two blocks  $A = 10\text{kg}$ ,  $B=28\text{kg}$  are separated by  $12\text{m}$  as shown in fig.6. If the blocks start moving, find the time  $t$  when the blocks collide. assume  $\mu = 0.25$  for block  $A$  and plane and  $\mu = 0.10$  for block  $B$  and plane. 8



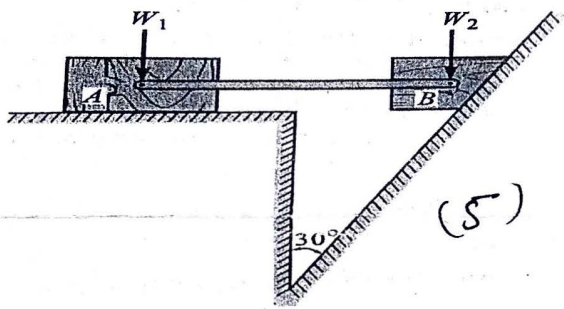
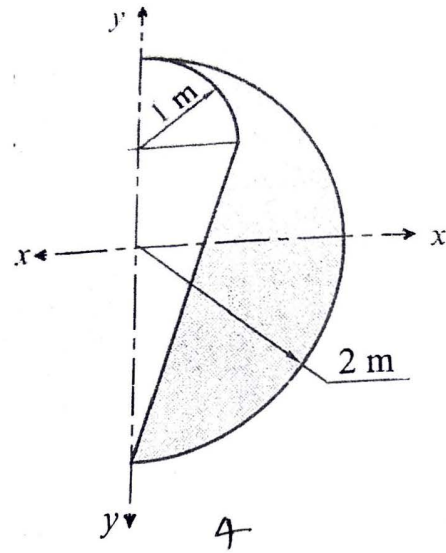
(1)



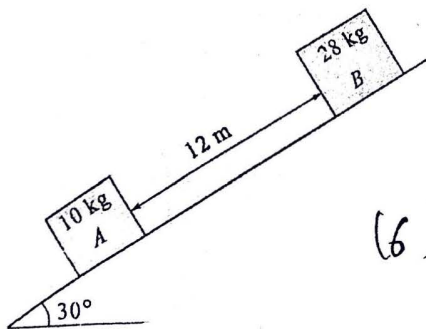
(2)



(3)



(5)



(6)



Department of Computer Science and Engineering  
CSE -201, Data Structures, End-Sem Exam (2k17 batch)

Max Time :3 hrs

Max Marks : 40

Please attempt all the questions. Show workings and give reasons wherever required.

Q1. For each statement write 'yes' or 'no' or answer in two three words. Give one line of explanation to support the answer. (3)

- (a) The Selection sort has the highest best-case runtime complexity.
- (b) For searching, if the data is sorted and uniformly distributed then name the best search algorithm which should be used.
- (c) Arithmetic evaluation is an application of stack data structure
- (d) Heap is an example of binary search tree
- (e) Hash table has search efficiency of  $O(1)$
- (f) Depth first search in a graph is implemented using queues.

Q2. Answer all parts clearly.

- (a) A single array  $A[1..MAX]$  is used to implement two stacks. The two stacks grow from opposite ends of the array. Variables  $top1$  and  $top2$  ( $top1 < top2$ ) point to the location of the topmost element in each of the stacks. If the space is to be used efficiently, the condition for "stack full" is one of the following. (3)

- 1. ( $top1 = MAX/2$ ) and ( $top2 = MAX/2+1$ )
- 2.  $top1 + top2 = MAX$
- 3. ( $top1 = MAX/2$ ) or ( $top2 = MAX$ )
- 4.  $top1 = top2 - 1$

Explain in short about each condition and identify the correct condition.

- (b) An *INCORRECT* pseudocode for the algorithm which is supposed to determine whether a sequence of parentheses is balanced or not is given below. Give two different invalid examples of expressions which will not be identified by this code. (2)

```

declare a character stack
while (more input is available)
{
    read a character
    if (the character is a '(' )
        push it on the stack
    else if (the character is a ') ' and the stack is not empty)
        pop a character off the stack
    else
        print "unbalanced" and exit
}
print "balanced"

```

- © What is the value of this prefix expression assuming single digit data. (1.5)

- ++16\*75/42

- Q3. (a) What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0. (1.5)  
 (b) Build an AVL trees for the following data: 10, 20, 30, 40, 50 (1.5)  
 (c) If preorder traversal of a binary tree is BCDAE and inorder traversal is DACBE then build the tree. (1.5)

Q4. Attempt any Three only. (6)

- (a) Given the start pointer START of a linked list which has five nodes, write a function which will swap first and second node. Be careful, function should not just swap the data, it has to swap nodes.  
 (b) Given the root pointer of a binary search tree, write a function to delete the left child of the tree assuming that the left child may have at the most one left subtree only.  
 © Write a recursive function to find the number of leaf nodes in a binary tree.  
 (d) Given the **Last** pointer pointing to last node of a circular linked list, write a function to delete first node of a circular linked list.

Q5. (a) For the given data, perform the following sorting algorithms.

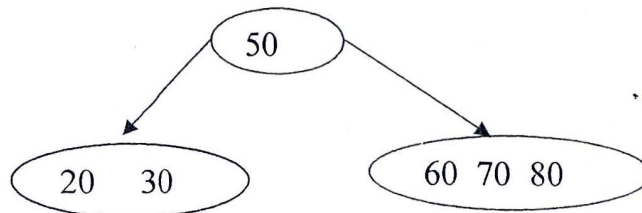
15 19 10 110 45 9 (4)

1. Bubble Sort
2. Quicksort (Just do one step of partitioning)
3. Shell sort taking  $k=3$  and  $k=1$
4. Radix sort

Q6. (a) Define B-tree and insert the following entries into an initially empty B-tree of **order 7**. (2)

20 50 35 45 68 29 60 70 10 40 100 24 54 74 84 95 77

(b) Given a B-tree of order 5, delete the keys 50 and 30 one after another. (2)





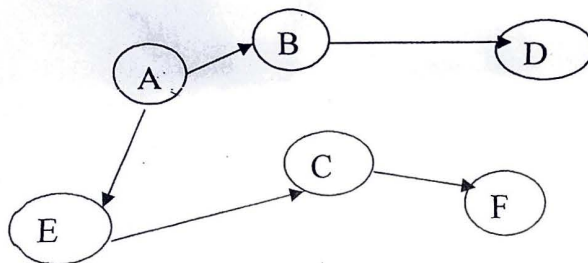
Q7. Suppose that a hash table contains  $\text{HASHSIZE} = 20$  entries ordered from 0 through 19 and the following keys are to be mapped into the table – 125, 10, 100, 132, 45, 58, 26, 43, 129, 105, 39, 62

Determine the **hash addresses** using -  $\text{mod HASHSIZE}$  function. Handle the collisions using linear probing. Show the hash table after insertion. (3)

Q8. Explain Priority queue. Suppose a programmer is writing the Operating System of a computer and wants to use priority queue to allocate CPU to processes according to their priority. He/she is trying to understand the working of data structures to implement a priority queue. The programmer takes the example of 6 processes (P1-P6) having priorities (2, 4, 1, 6, 8, 3) where '1' denotes highest priority and starting at time  $t=0$  if each process is coming after 1 second and execution time of each process is 3 seconds, then explain how insertions and deletions will take place: (2+2)

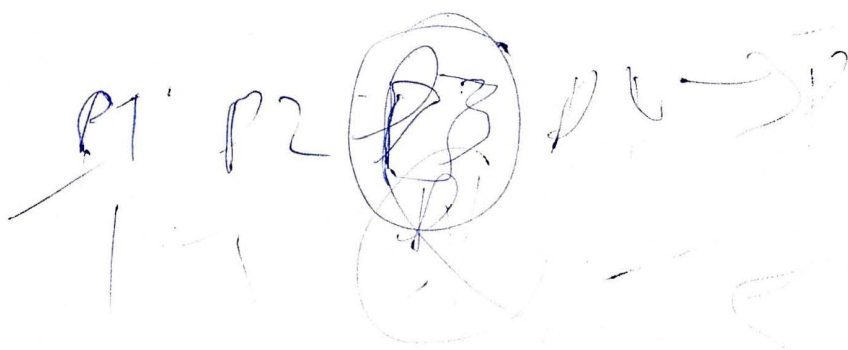
- If the programmer uses an unsorted array
- If heap data structure is used by the programmer

Q9. (a) Explain two different ways of implementing a graph data structure. For the given directed graph below: write a Breadth first traversal and a Depth first traversal taking node A as root. (2+2)



- For the above directed graph, write all the possible Topological Sortings. (2)

\*\*\*\*\*All the Best\*\*\*\*\*



**END Semester Examination -2018**

**Digital Electronics**

**CSE-S-202**

**B.Tech. CSE- II<sup>nd</sup> Year**

**Time: 3 Hours**

**M.M:40**

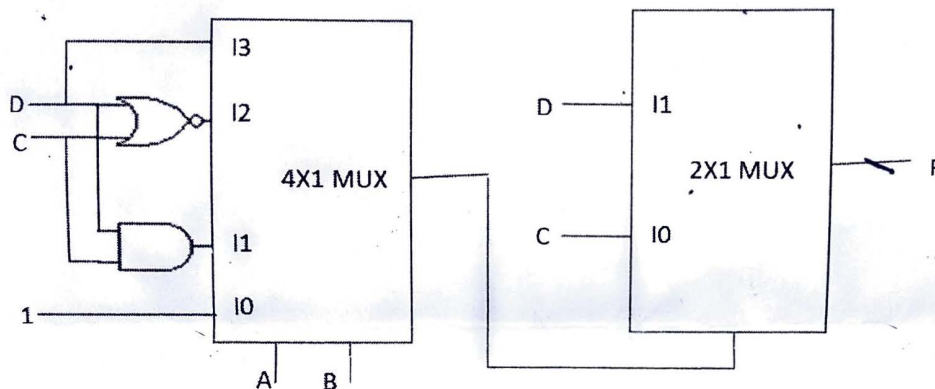
**Note: Attempt all questions. Each question carries equal marks**

✓ Q1 A. How Boolean algebra is different and similar to ordinary algebra? Explain basic rules and postulates of Boolean algebra with suitable examples?

✓ Q1 B. Minimize following Boolean function with tabulation method.

$$F(A,B,C,D) = \sum(0,1,3,5,7,9,11,12,13,15)$$

✓ Q2. Find Boolean function for output F and implement it with 2 X 4 decoder(s).



✓ Q3. Define minterm and maxterm? How these terms are helpful in finding Boolean expression for a Boolean function? Explain with suitable examples.

✓ Q4. What do you mean by the prime implicants and essential prime implicants? Give an example in which prime implicants are same as essential prime implicants.

Q5. Explain use of BCD Codes? Implement circuit to add two BCD numbers.

✓ Q6. What is the basic memory element in digital computer and how it can store one bit? Classify and implement circuit of different type of registers.

• Q7. Implement circuit of four input XOR gate with 4X1 multiplexer.

Q8. Explain ASCII decoding scheme with their uses and decode the following ASCII message.  
1010011101010010101011000100101100101000001001000100000110100101000100

Q9. Design 4 bit synchronous up/down counter using SR Flip Flop with mode control m. If m is 1 then circuit will work as up counter and if mode control m is 0 then circuit will work as down counter.

Q10. Obtain the simplified expressions in sum of products for the following Boolean functions:

$F = A'B'CE' + A'B'C'D' + B'D'E' + B'C D'$  and implement simplified expression with 1X4 demultiplexer.





UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY  
End Semester Examination (December 2018)  
ESC-S202: Basic Thermodynamics (Computer Science)

Time: Three Hours

Marks: 50

1. Define the following:

(2×10)

- (i) Zeroth law of Thermodynamics
- (ii) Macroscopic and Microscopic system analysis
- (iii) PMM1
- (iv) Draw Carnot cycle and name its four processes
- (v) COP of a refrigerator
- (vi) Physical description of the Entropy
- (vii) Third law of thermodynamics
- (viii) Sensible heat and Latent heat
- (ix) Normal boiling point and Triple point
- (x) Sketch proper P-V diagram for a pure substance

2. Classify the following into extensive and intensive properties:

Density, enthalpy, entropy, heat capacity, pressure, specific heat, temperature, vapour pressure, viscosity, volume. (5)

3. The basic barometer can be used to measure the height of a building. If the barometric readings at the top and at the bottom of a building are 730 and 760 mm Hg, respectively, determine the height of the building. Assume an average air density of  $1.18 \text{ kg/m}^3$ . (5)

4. A temperature scale A is defined by arbitrarily identifying the boiling point of a particular substance (whose boiling point is  $160^\circ\text{C}$ ) as  $85^\circ\text{A}$ . The freezing point of the same substance is  $-10^\circ\text{A}$  on this new scale. If the absolute zero of temperature on the A scale is  $-100^\circ\text{A}$ , what is the freezing point of the substance on the Fahrenheit scale, assuming that boiling and freezing points are determined in each case at a pressure of 1 atm? (5)

5. If 20 kJ are added to a Carnot cycle at a temperature of  $100^\circ\text{C}$  and 14.6 kJ are rejected at  $0^\circ\text{C}$ , determine the location of absolute zero on the Celsius scale. (5)

6. Ten grams of water at  $20^\circ\text{C}$  is converted into ice at  $-10^\circ\text{C}$  at constant atmospheric pressure. Assuming the specific heat of liquid water to remain constant at  $4.2 \text{ J/gm.K}$  and that of ice to be half of this value, and taking the latent heat of fusion of ice at  $0^\circ\text{C}$  to be  $335 \text{ J/gm}$ , calculate the total entropy change of the system. (5)

7. A hot spring produces water at a temperature of  $56^\circ\text{C}$ . The water flows into a large lake, with a mean temperature of  $14^\circ\text{C}$ , at a rate of  $0.1 \text{ m}^3$  of water per minute. What is the rate of working of an ideal heat engine which uses all the available energy? (5)