Code No.2888/AICTE/S

FACULTY OF ENGINEERING

B.E. (CE/EE/Inst./M/P/AE)) (AICTE) III – Semester (Suppl.) Examination, November/December 2020

Subject: Engineering Mechanics

Time: 2 hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable.)

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. Explain Lami's theorem.
2. Determine X, Y and Z component of 100N force passing from origin to a point (1,2,3).
3. List theorems of moment of inertia with statements.
4. Find the radius of gyration of a circular section of radius 100mm.
5. Differentiate between method of joints and methods of sections.
6. State laws of friction.
7. Explain the concept of dynamic equilibrium.
8. A stone is thrown vertically upwards and returns to earth in 3 seconds. How high does it go?
9. Differentiate between direct impact and oblique impact.
10. A body of mass 6kg is moving with a velocity of 40m/s. What will be the kinetic energy of the body?

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. A bar of 4m length and negligible weight is resting on smooth planes at A and B subjected to loads as shown in figure (1). Determine the angle 'θ' for equilibrium.

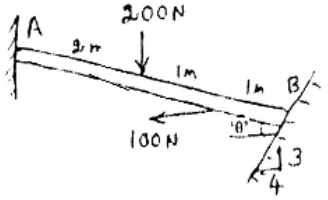

Figure (1)

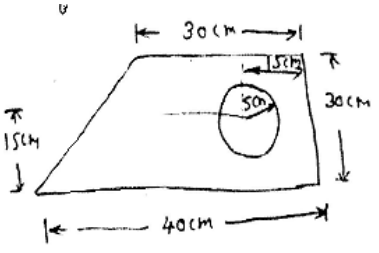

Figure (2)

12. Locate the centroid of the area as shown in figure (2).
13. Determine the moment of inertia of the figure (3) about horizontal base axis and vertical centroidal y-y axis.

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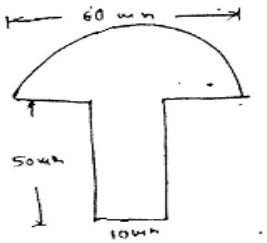

Figure (3)

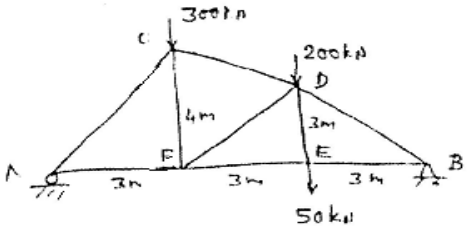

Figure (4)

14. Determine the forces in all members of truss as shown in figure (4) by method of joints.

15. A horizontal bar 16m long and of negligible weight rests on rough inclined planes as shown in figure (5). If the angle of friction is 15^0, how close to 'B' may the 200N force be applied before motion impends?

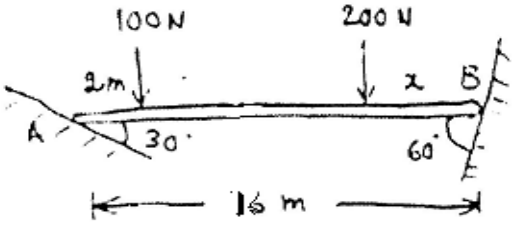

Figure (5)

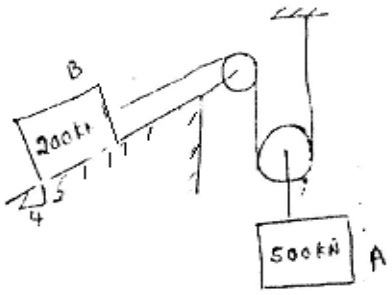

Figure (6)

16. Find out the acceleration of block 'B' required for connecting the bodies as shown in figure (6), if the kinetic friction under 200KN block is 0.2.

17. Block 'A' and 'B' as shown in figure (7) have a mass of 3 Kg and 5 Kg respectively. If the system is released from rest, determine the velocity of block 'A' in 6 seconds. Neglect the weight of pulley and chord.

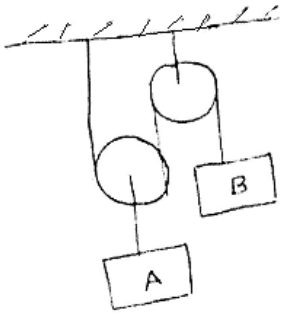

Figure (7)

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Code No.2901/AICTE/S

FACULTY OF ENGINEERING

B. E. (ECE) (AICTE) III – Semester (Suppl.) Examination, December 2020

Subject: Elements of Mechanical Engineering

Time: 2 hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable.)

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. Explain mechanical and thermal efficiency as applied to I.C. engine.
2. State Fourier law of conduction.
3. State Stefan Boltzmann law and write SI unit of each term.
4. Define black body and gray body.
5. Differentiate between impulse turbine and reaction turbine.
6. Define cavitation in pumps.
7. Define addendum and dedendum.
8. Explain bevel gears.
9. Define slip and how it effects belt drive.
10. Explain taper turning and step turning along with neat sketches.

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. (a) Distinguish between four stroke engine and two stroke engine.

    (b) Explain the valve timing diagram of 4 stroke SI engine.

12. (a) Derive an expression for heat loss through a composite wall of layers considering conductive heat transfer coefficient.

    (b) A brick wall (K = 0.72 W/mK) is 0.6m thick. If the temperatures of the inner and outer surfaces are maintained at 100^0c and 25^0c respectively, calculate the heat loss through the wall per square meter. Also find the temperature at the interior point of the wall at 16cm distance from outside surface.

13. (a) Derive an expression for the LMTD for parallel flow heat exchanger.

    (b) In an oil cooled electric transformer 150.9kg of oil is cooled from 80^0c to 30^0c in a double pipe heat exchanger using 3000 kg of water per hour available at 16^0c. Assuming the overall heat transfer coeff. Of 250 W/m^2 ^{0}c and flow is parallel, find the area required.

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14. (a) Derive an expression for overall efficiency of Pelton wheel.

    (b) A centrifugal pump has external and internal diameter of impeller as 700mm and 350mm respectively. the vane angle at inlet and outlet are 25^0 and 45^0 respectively. If the water enters the impeller radially at 4 m/s, determine speed of the impeller and work done per kg of water.

15. (a) Classify different types of gears and mention their applications.

    (b) Derive an expression for the length of belt in cross belt drive.

16. (a) Differentiate between welding, brazing and soldering.

    (b) Explain the working principle of 3D printing.

17. Write short notes on the following:
    (a) Difference between reciprocating pump and centrifugal pump.
    (b) Spur and helical gear.
    (c) Oxyacetylene flames.

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Code No: 2912/AICTE/S

FACULTY OF ENGINEERING

BE III – Semester (AICTE)(CSE) (Suppl.) Examination, December 2020

Subject: Discrete Mathematics

Time: 2 Hours **Max Marks: 70**

Note: (Missing data if, any can be assumed suitable.)

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. Show that $(p \rightarrow r) \wedge (q \rightarrow r)$ and $(p \vee q) \rightarrow r$ are logically equivalent.
2. What is well-formed formula. Give example.
3. Obtain the truth table for the function

   $f(x,y,z) = xyz + x^1y^1z^1 + x^1y$
4. Find the coefficient of $x^{12}y^{13}$ in the expansion of $(x + y)^{25}$?
5. A young pair of rabbits (one of each sex) is placed on an island. A pair of rabbits does not breed until they are 2 months old. After they are 2 months old, each pair of rabbits produces another pair each month. Find the recurrence relation for the number of pairs of rabbits on the island after n months, assuming that no rabbits ever die.
6. What is divide-and-conquer approach. Give examples of Divide-and-conquer algorithms.
7. Find E(X), Variance X for

X	-3	6	9
P(X=x)	1/6	1/2	1/3

8. What is the chromatic number of K_n? Explain?
9. In a Boolean algebra if $a + b = \bar{x}$ and $a + \bar{x} = b + \bar{x}$ then prove that a = b.
10. A tree with n vertices has (n-1) edges prove.

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. a) Let f and g be the functions from set of integers to the set of integers defined by f(x) = 2x+3 and g(x) = 3x+2 find i) fog ii) gof.
    b) Give a big-O estimate for $f(n) = 3n \log(n!) + (n^2 + 3)\log n$ where n is a positive integer.
12. How many Solutions does the equation $x_1 + x_2 + x_3 = 11$ have x_1, x_2, x_3 are non-negative integers.
13. Solve the recurrence relation $a_n = 3a_{n-1}$ for n = 1, 2, 3 and a_0=2 using generating functions.
14. Show that the graphs G = (V, E) and H = (W,F) are isomorphic.

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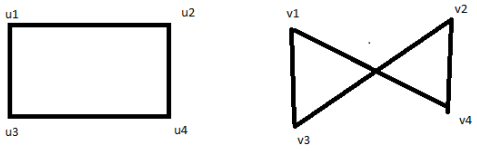
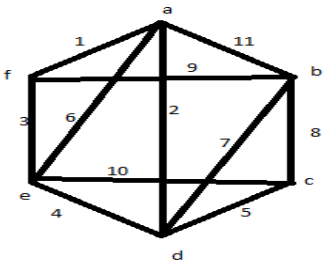


15. Tower of Hanoi consists of three pegs mounted on a board together with disks of different sizes. Initially these disks are placed on the first peg in order of size, with largest on the bottom. The rules allow disks to be moved one at a time from one peg to another as long as a disk is never placed on top of a smaller disk. The goal is to have all the disks on the second peg in order of size with the largest on the bottom set up a recurrence relation for the sequence $\{H_n\}$.

16.a) What is POSET. Explain with example.

b) Explain differences between Monoids and Semi-groups.

17. Using Prim's algorithm, determine minimal spanning tree
10M



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Code No : 2915/AICTE/S

FACULTY OF ENGINEERING

B.E. III Semester (AICTE) (I.T) (Suppl.) Examination, December 2020

Subject : Mathematical Foundations of Information Technology

Time : 2 Hours **Max. Marks : 70**

Note: (Missing data if, any can be assumed suitable.)

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. Write the Converse, Inverse and Contra positive of the following implication :

   "If I Stay up late, then I sleep Until noon"

2. Let f and g be functions from the set of integers to set of integers defined by f(x)=2x+3 and g(x) =3x+2.What is (f ∘ g) (x) and (g ∘ f) (x).
3. State Pigeonhole Principle.
4. Find the generating function of the sequence {1,1,1,1,1,1}.
5. Define chromatic number of a graph with example.
6. Define Tautology, Contradiction and Contingency.
7. Write the truth table for Bi-Implication p↔q.
8. How many relations are there on a set with n elements?
9. How many different strings can be made by reordering the letters of the word "VICTORY"?
10. Define the terms i) Planar Graphs
    ii) Degree of a vertex

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. a) Construct the truth table of the compound proposition : (p v ~q) -> (p ∧ q).
    b) Show that (p ↔q) and (p ∧ q) v (~p ∧ ~q) are logically equivalent.

12. a) Draw the Hasse diagram representing the partial ordering {(a,b) | a divides b} on {1,2,3,4,6,8,12}.
    b) Determine whether the function f from {a,b,c,d} to {1,2,3,4,5} with f(a) = 4,f(b) = 5,f(c) = 1, and f(d) = 3 is one-to-one.

13. a) State and derive principle of Inclusion-Exclusion.
    b) What is the coefficient of $x^{12}y^{13}$ in the expansion of $(x+y)^{25}$.

14. a) Find the coefficient of x^{10} in $(x^3+x^4+x^5+\ldots\ldots\ldots\ldots)^3$
    b) Solve the recurrence relation $a_n=a_{n-1}+2^n+3$; $a_o=4$.

15. Explain Prim's algorithm to find a minimum cost spanning tree with an example.

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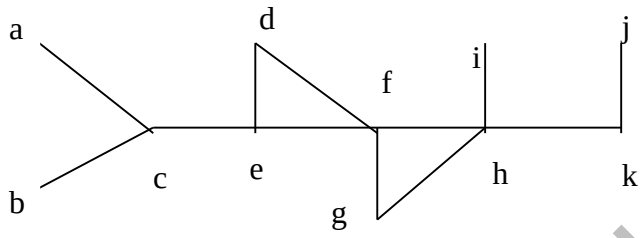
16. a) Define proposition. Construct truth table for P→(Q→R).

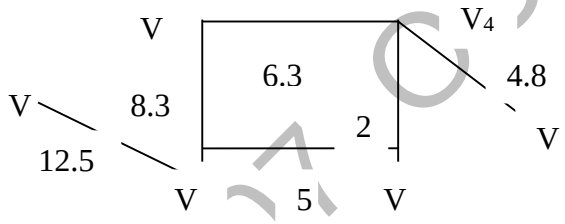
b) Using rules of inference to show that the hypotheses follows the conclusion.

Randy works hard,
If Randy works hard, then he is a dull boy
If Randy is a dull boy, then he will not get the job
Randy will not get the job

17. a) Use Depth First Search algorithm to find spanning tree for the graph given below:



b) Find minimum cost spanning tree using kruskal's algorithm for the following graph.



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