FACULTY OF ENGINEEERING

B.E. (CIVIL/EEE/EIE/MECH/PROD/AE) III - Semester (AICTE) (Main & Backlog) Examination, March / April 2022

Subject: Engineering Mechanics

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1 State Lami's theorem.
2 Explain Moment and Couple.
3 Differentiate between centroid and center of gravity.
4 Determine radius of gyration of Circular area of Diameter '30mm' about its diametrical axis.
5 State cone of friction.
6 State assumptions made in the analysis of perfect frames
7 Differentiate between linear and projectile motion.
8 A ball is thrown at a rate of 30m/sec at an angle of 20º w.r.t. horizontal, find the time taken by ball to cover a horizontal distance of 100m.
9 State work energy principal in translation.
10 A ball is falling from a height of 3m and rebound to 2.8m, find its coefficient of restitution.

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11 Find the magnitude 'P" and angle 'Ø" for concurrent force system as shown in figure-1 below, which will develop a vertical upward resultant of 300kN.

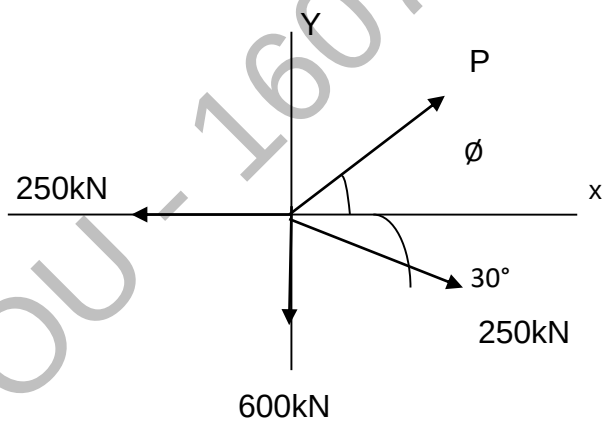

Figure-1

12 With respect to the given axes, find the centroid of the shaded area shown in figure-2.

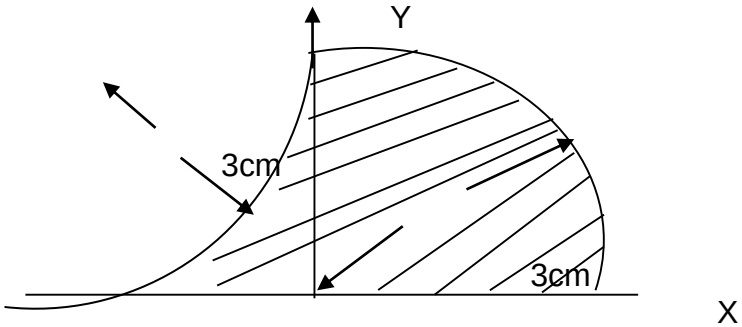

Figure- 2

13 Determine the moment of inertia of L- section shown in figure-3 about its both centroid axes.

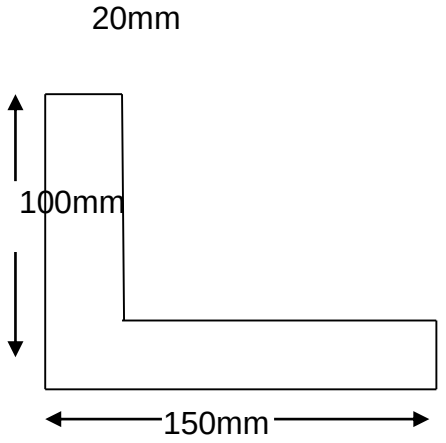

Figure-3

14 Determine the least value of the force 'P' to cause motion to impend rightwards. Assume the co-efficient of friction under the blocks to be 0.2 and the pulley to be friction less. Figure-4

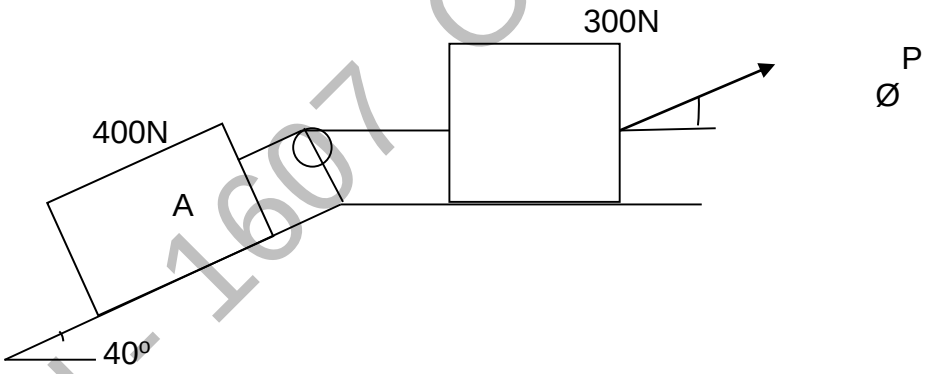

Figure-4

15 Determine the acceleration of the 5kg cylinder 'A'. Neglect the mass of pulleys and cords. The block 'B' has a mass of 10kg. The coefficient of kinetic friction between block 'B' and surface is 0.2. Figure-5

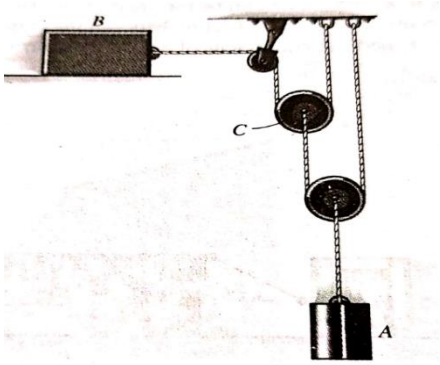

Figure-5

16 A bullet weighing 0.5N and moving at 630m/s penetrates the 120N body which is resting on horizontal surface with coefficient of kinetic friction as 0.2, and emerges with a velocity of 90m/s. How far and long does the body then move?

17 (a) A stone is dropped down the well and 4 seconds later the sound of the splash is heard. If the velocity of sound is 320m/s, what is the depth of the well?

(b) Using Method of joints, find the forces in all the members of the truss as shown below. Figure-6

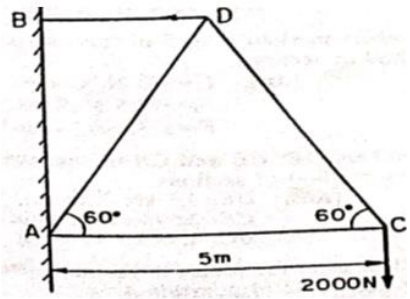

Figure-6

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Code No. D-2035/O/AICTE

FACULTY OF ENGINEEERING

B.E. (ECE) III - Semester (AICTE) (Main & Backlog) Examination,
March / April 2022
Subject: Elements of Mechanical Engineering

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1. Define entropy and enthalpy.
2. What is Clasius inequality?
3. Compare petrol and diesel engine with respect fuel consumption and power developed.
4. List out the application of compressed air.
5. Define heat transfer, what are the modes of heat transfer?
6. State the Stefan – Boltzmann Law of radiation.
7. Draw a neat sketch of a spur gear. Write the nomenclature.
8. Define angle of contact in belt drives.
9. List application of welding and brazing process.
10. What is the purpose of machining processes?

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11. a) Derive the Steady flow energy equation for an open system and list out assumptions made in it.
    b) Explain macroscopic and microscopic approach of thermodynamics.

12. a) Explain with neat sketch working of four-stroke diesel engine.
    b) Derive an expression for the LMTD for parallel flow heat exchanger.

13. a) Derive thermal conduction of a material using Fourier's Law of conduction.
    b) Explain about counter flow heat exchangers.

14. a) Differentiate between welding, brazing and soldering.
    b) Classify different types of gears and mention their applications.

15. a) Explain simple gear train and compound gear train.
    b) Derive the ratio of tensions of flat belt with neat diagram.

16. a) Explain the working of a die casting machine with a neat sketch.
    b) Explain the principals of following machining operations:
    (i) Milling (ii) Grinding

17. Write short notes on the following:
    a) Air compressors.
    b) Metal milling operation with neat sketch.
    c) Belt materials.

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Code No: D-2048/O/AICTE

FACULTY OF ENGINEERING

BE (CSE) III – Semester (AICTE)(Main & Backlog) Examination,
March / April 2022
Subject: Discrete Mathematics

Time: 3 Hours **Max Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1. If the domain is the set of integers then what is the truth value of the statement
   $\forall n\ (n+1) > n$
2. Express gcd (252, 198) =18 as a linear combination of 252 and 198
3. Using mathematical induction show that $1+2+2^2+\ldots\ldots+2^n=2^{n+1}-1$
4. How many permutations of the letters ABCDEFGH contains the string ABC?
5. Find the solution to the Recurrence relation $a_n=6a_{n-1}-11a_{n-2}+6a_{n-3}$, $a_{0=2}$, $a_{1=5}$, $a_{2=15}$
6. What is recurrence relation? Write different methods to solve recurrence relations?
7. Is the "divides" relation on the sets of positive integers symmetric? Is it Anti symmetric?
8. A= {1, 2, 3, 4}, write a relation on A such that it is both Asymmetric and Anti symmetric?
9. List applications of Trees?
10. Define Spanning trees?

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11. a) Show that $(P\rightarrow Q)\ \wedge(Q\rightarrow R) <-> (P \vee Q)\rightarrow R$
    b) Show that $(P\rightarrow Q) <-> \sim P \vee Q$

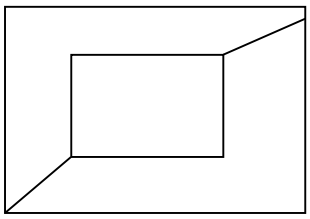
12.a) What is the minimum number of students ,each of whom comes from one of the 50 states ,who must be enrolled in a university to guarantee that there are at least 100 who came from the same state?
    b) How many solutions does the equation $x_1+x_2+x_3=11$ have where x_1,x_2,x_3 are non negative integers?

13. Find all solutions of the Recurrence relation $an=5a_{n-1}-6a_{n-2}+7^n$

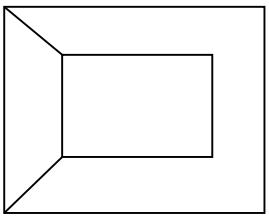
14. Draw the Hassae diagram representing the
    a) Partial ordering {{a,b}| a divides b} on a set of { 1,2,3,4,6,8,12}
    b) Determine the POSETS { {1,2,3,4,5},|} and {{1,2,4,8,16},|} are Lattices?

15. Explain tree traversals with examples?

16. a) The following graphs are isomorphic or not?



G1



G2

    b) Show that sum of degrees of all the vertices is equals to 2 *|E|

17. a) Write the applications of number theory?
    b) Find the GCD of 414 and 662 using EUCLIDEAN algorithm

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Code No. D-2052/O/AICTE

FACULTY OF ENGINEERING

B.E. (CME) III - Semester (AICTE) (Main & Backlog) Examination, March / April 2022

Subject: Basic Electronics Engineering

Time: 3 hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions **(10 x 2 = 20 Marks)**

1 List the applications of Cathode Ray Oscilloscope.
2 Define Cut-in voltage of diode. What is its value for Si and Ge diode?
3 What is pinchoff Voltage?
4 Define α, β and γ.
5 Derive an expression for the gain of the amplifier with feedback.
6 What are the ideal characteristics of Op-amp.
7 Define the terms CMRR and Slew rate of Op-amp.
8 Give the truth table of Full-Adder.
9 Explain Gauge factor for a strain Gauge.
10 What is meant by Seebeck effect?

PART – B

Note: Answer any five questions **(5 x 10 = 50 Marks)**

11 a) Explain V-I characteristics of PN junction diode under Forward and Reverse bias conditions.
b) What is TUF? What is its significance?

12 a) Explain the input and output characteristics of CB configuration.
b) Explain the working of JFET and also describe the drain and transfer characteristics.

13 a) Derive input and output impedance for Volt-Shunt Feedback.
b) Derive the general equation for LC Oscillator.

14 a) Draw the half-Adder with its truth table. Draw it only using NAND gate.
b) What are Universal Gates and write their truth tables.

15 a) With neat block diagram explain briefly about Flash Analog to Digital Convertor.
b) Write short notes on Successive approximation ADC.

16 Explain in detail the construction and working operation of Linear Variable Differential Transformer.

17 Write short notes on
a) Avalanche Breakdown b) JFET c) Op-amp as integrator

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Code No: D-2056/O/AICTE

FACULTY OF ENGINEERING

B.E. (I.T) III – Semester (AICTE) (Main & Backlog) Examination,
March / April 2022
Subject: Mathematical foundations of I.T

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1. Show that $(p \rightarrow q) \wedge (p \rightarrow r) \approx p \rightarrow (q \wedge r)$.
2. Define free and bound variables.
3. Determine whether the function $f(x) = x^2$ from the set of integers to asset of integers is one-to-one or not.
4. Let $f:Z \rightarrow Z$ and $g:Z \rightarrow Z$, defined as $f(x)=2x+3$ and $g(x)=3x+2$, then compute fog and gof
5. Define Counting.
6. Define sum rule and product rule.
7. What is Fibonacci relation and list out its properties?
8. Find the coefficient of x^{16} in $(1+x^4+x^8)^{10}$.
9. Define degree of the vertex with example.
10. What are the rule for Hamiltonian and Euler graph?

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11 a) Construct the truth table of the compound proposition $(p \vee \neg q) \rightarrow (p \wedge q)$.

b) Express the statement "Everyone has exactly one best friend" as a logical expression involving predicates, quantifiers with a universe of discourse consisting of all people and logical connectives.

12 a) Draw the Hasse diagram representing the partial ordering {(a, b)|a divides} on {1, 2, 3, 4, 6, 8,12}.

b) Determine whether $(P(S), \subseteq)$ is a lattice where S is a set.

13 a) There are 7 gentlemen and 4 ladies a committee of 6 is to form in how many ways it can be done

(i) The committee contains exact two ladies.

(ii) At least two ladies.

b) There are 345 students at a college who have taken a course in calculus, 212 who have taken a course in mathematics and 188 who have taken a course in both calculus and mathematics. How many students have taken a course in either calculus or mathematics?

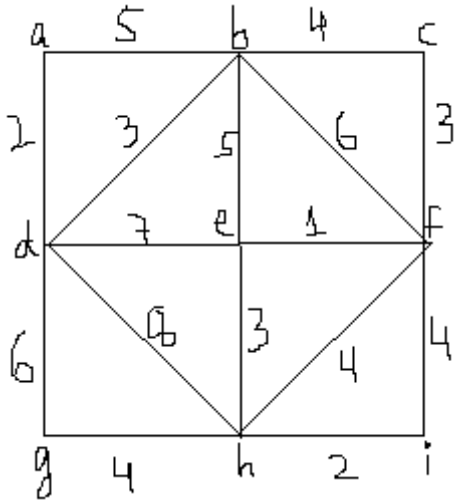
14 a) What is the solution of recurrence relation $a_n=6a_{n-1}-9a_{n-2}$ with initial conditions $a_0=1, a_1=6$.

b) Find the number of solutions of $e_1+e_2+e_3=17$ where e_1, e_2, e_3 are nonnegative integers with $2 \le e_1 \le 5$, $3 \le e_2 \le 6$, $4 \le e_3 \le 7$.

15. Explain Normal forms each with examples.
    a) CNF and DNF b) PCNF and PDNF

16. a) What is the coefficient of $x^3 y^7$ in the binomial expansion of $(2x-9y)^{10}$
    b) State and proof Binomial theorem

17. Write Kruskal's algorithm to find an MST. Obtain an MST for the graph shown in figure below using Kruskal's algorithm.



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FACULTY OF ENGINEEERING

B.E. (Civil) III - Semester (AICTE) (Main) Examination, March / April 2022

Subject: Surveying and Geomatics

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed

1 (a) What are the primary classifications of surveying?

(b) Differentiate between WCB and QB system of bearings.

(c) Write the formula of Simpson's and Trapezoidal rule for computing area.

(d) What are the advantages of tacheometric surveying over other methods?

(e) Mention advantages of using Total station.

(f) What is meant by Shift of a curve?

(g) What do you understand by the term Photogrammetry?

2 (a) The following bearings were observed while traversing with a compass. Determine
the correct bearings.

Line	F.B.	B.B
AB	44°30'	226°45'
BC	124°30'	303°15'
CD	181°00'	1°00'
DE	289°30'	108°30'

(b) Demonstrate the three point problem in the plane table surveying.

3 (a) The following consecutive readings were taken with a dumpy level: 0.800,1.350, 2.400, 1.375, 2.945, 3.125, 3.725, 0.100, 1.975, 2.125 and 1.775. The instrument was shifted after the third, fourth and seventh readings. The first reading was taken with a staff held on benchmark of elevation 150.000. Enter the readings in a level book form and reduce the levels by the rise and fall method. Apply the usual checks.
(b) How do you determine the quantity of earth work for a borrow pit?

4 (a) The top (B) of a tower was sighted from two stations A and C at different levels, the station A and B being in line with top of tower. The angle of elevation from A to the top of tower is 49°31' and that from C to the top of tower was 31°28'. The angle of elevation from C to a vane 2 m above the foot of staff held at A was 25°21'. The heights of the instrument at A and C were 2.87 m and 2.64 m respectively. The horizontal distance between A and C was 137m and the reduced level of C was 122.78m. Calculate the R.L. of the top of the tower and the horizontal distance from A to the tower.

..2

(b) What is tacheometer? What are different systems of tacheometric measurements?

5 (a) Explain the necessity of transition curve and derive the intrinsic equation for ideal transition curve.
(b) Classify the different curves with examples?

6 (a) What is an idealized remote sensing system? Discuss the role of EM energy involved in it.
(b) Write a short note on different types of photographs.

7 (a) Discuss the characteristics of contours. Give suitable sketches.
(b) What are the-principles of surveying? Explain-them briefly.

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