CBCS SCHEME

USN | | | | | | | | | |

BESCK104A/BESCKA104

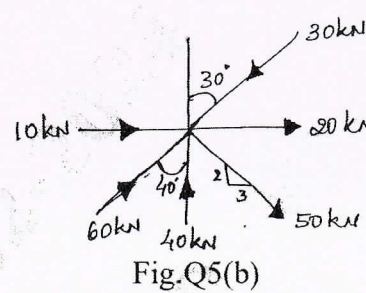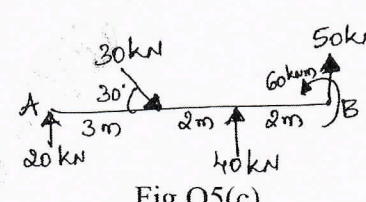## First Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.2024
Introduction to Civil Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	a.	Explain briefly the scope of following specification of civil engineering: i) Environmental Engineering ii) Structural Engineering	08	L1	CO1
	b.	Write the composition of cement.	06	L1	CO1
	c.	What is brick? Write the classes of bricks.	06	L1	CO1
		OR			
Q.2	a.	Differentiate Reinforced and Prestressed Concrete.	08	L1	CO1
	b.	Write a note on Construction Chemicals.	06	L1	CO1
	c.	Enumerate Structural Elements of a building.	06	L1	CO1
		Module – 2			
Q.3	a.	Discuss on salient points on sustainable development goals.	08	L1	CO2
	b.	Write a note on Smart City Concept.	06	L1	CO2
	c.	Describe Solid Waste Management.	06	L1	CO2
		OR			
Q.4	a.	Write the key points to be considered while identifying the landfills sites.	08	L1	CO2
	b.	Explain Refuse, Reuse and Recycle concepts.	06	L1	CO2
	c.	Write a note on Energy Efficient buildings.	06	L1	CO2
		Module – 3			
Q.5	a.	Explain principles of superposition with a neat sketch.	04	L2	CO3
	b.	Determine the resultant of the system of forces shown in the Fig.Q5(b) below:	08	L3	CO3

Fig.Q5(b)

	c.	Determine the resultant of non concurrent system of forces shown in the Fig.Q5(c) below:	08	L3	CO3

Fig.Q5(c)

		OR			
Q.6	a.	State and prove Varignon's theorem.	04	L2	CO3
	b.	Discuss resolution and composition of forces.	08	L2	CO3

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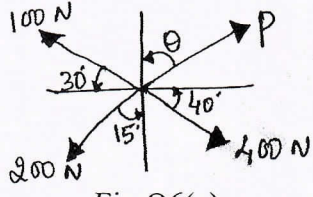|	c.	Four forces of magnitude P, 100 N, 200 N, and 400 N are acting at a point as shown in Fig.Q6(c). Determine the magnitude and direction of force 'P' such that the force system is in equilibrium.	08	L3	CO3

Fig.Q6(c)

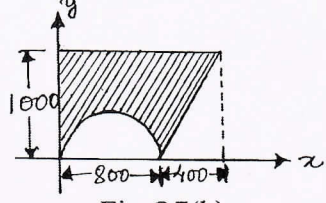|		**Module – 4**			
Q.7	a.	Derive the centroid of a triangle having base 'b' and height 'h' from the first principles.	05	L2	CO4
	b.	Locate the centroid of the shaded area shown in Fig.Q7(b) with respect to reference axis. All dimensions are in mm.	08	L3	CO4

Fig.Q7(b)

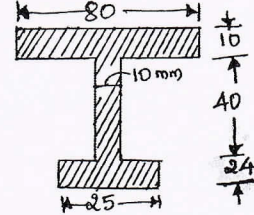|	c.	Locate the centroid of the shaded area shown in Fig.Q7(c). All dimensions are in mm.	07	L3	CO4

Fig.Q7(c)

		OR			
Q.8	a.	Derive the centroid of a rectangle of base 'b' and height 'h'.	05	L2	CO4
	b.	Determine the centroid of the shaded area shown in the Fig.Q8(b) below. All dimensions in mm.	08	L3	CO4

Fig.Q8(b)

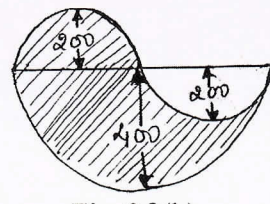|	c.	Determine the centroid of the shaded area shown in the Fig.Q8(c). All dimensions in mm.	07	L3	CO4

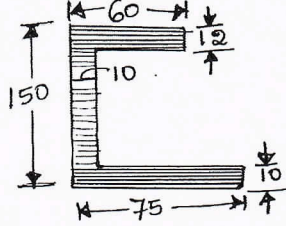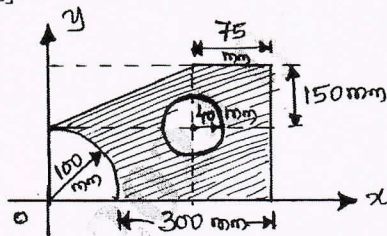Fig.Q8(c)

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| Module – 5					
Q.9	a.	State and prove parallel axis theorem.	05	L5	CO5
	b.	Derive the moment of inertia of a triangle of having base 'b' and height 'h' from the first principle.	05	L5	CO5
	c.	Find the polar moment of inertia of the plane lamina shown in Fig.Q9(c) about the point 'O' [I_{OZ}]. Note : Radius of circle is 40mm. Fig.Q9(c)	10	L5	CO5
OR					
Q.10	a.	Derive Moment of Inertia of a circle from the first principle.	05	L5	CO5
	b.	Define the terms i) Moment of Inertia ii) Radius of Gyration.	05	L5	CO5
	c.	Compute the MI of the area shown in Fig.Q10(c) about the axis AB. All dimensions are in mm only. Radius of circle is 20mm. Fig.Q10(c)	10	L5	CO5
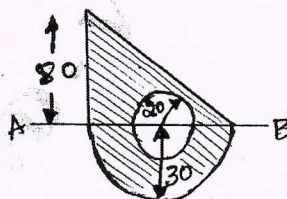
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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   **18CIV14/24**

First/Second Semester B.E. Degree Examination, Dec.2023/Jan.2024
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain briefly the scope of civil engineering in the specification of,
   (i)   Geo-technical engineering
   (ii)   Structural engineering   **(08 Marks)**
   b. Briefly explain the role of civil engineers in infrastructural development of the nation.
                                                                          (08 Marks)
   c. Define force and mention its characteristics.   **(04 Marks)**

OR

2 a. State and prove Varignon's theorem of moments.   **(08 Marks)**
   b. For the five force concurrent system acting on a bolt shown in Fig. Q2 (b), obtain the resultant force.
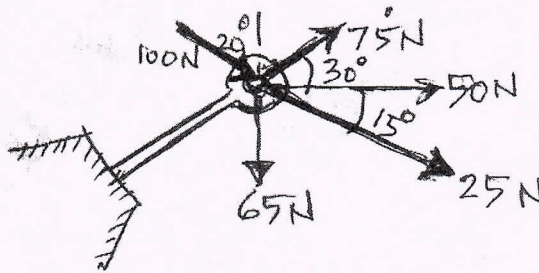

Fig. Q2 (b)   **(08 Marks)**
   c. What is moment of a force? Explain.   **(04 Marks)**

Module-2

3 a. Draw the FBD (Free Body Diagram) for a cylinder held between a smooth wall and a smooth rod. The bottom of the rod is hinged to the wall and top end is held by a string at an angle of $90°$ to the rod. The angle between the rod and wall is $30°$.
   Weight of cylinder = W_C ; Weight of rod = W_R, Length of rod = L, Radius of cylinder = r.
                                                                          (04 Marks)
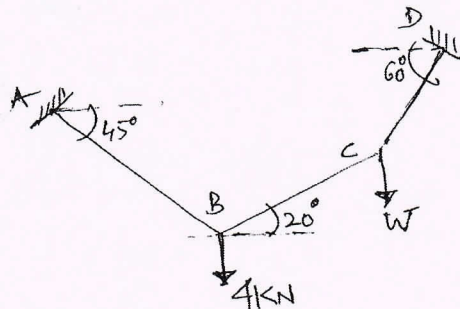   b. Determine the magnitude of W and tension induced in each segment of string for the Fig. Q3 (b) shown.

Fig. Q3 (b)   **(08 Marks)**
1 of 4

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c. Two smooth rollers of same radius and weight each equal to 200 N are placed in a trough as shown in Fig. Q3 (c). Find the contact reactions R_A, R_B, R_C and R_D assuming all surfaces are smooth.
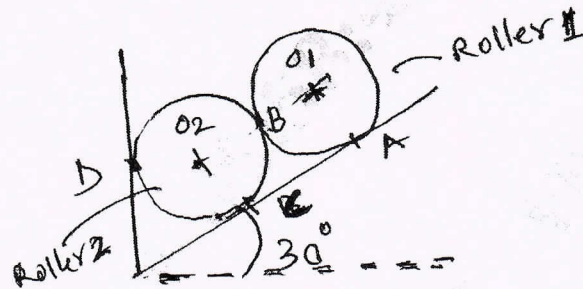

Fig. Q3 (c) **(08 Marks)**

OR

4 a. Define Friction and explain the different types of friction. **(06 Marks)**

b. A 1000 N block is placed on an inclined plane as shown in Fig. Q4 (b). Take co-efficient of friction of surfaces = 0.25.
Determine the horizontal force to be applied for,
   (i)   Impending motion down the plane.
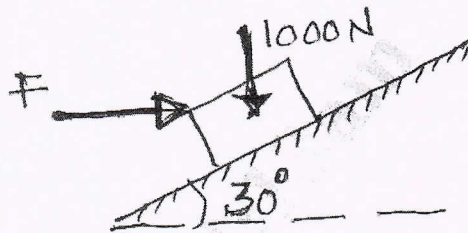   (ii)   Impending motion up the plane.

Fig. Q4 (b) **(08 Marks)**

c. A 100 N block resting on a rough horizontal surface is pulled by a 30 N force inclined at $15°$ with horizontal as shown in Fig. Q4 (c). Find the co-efficient of friction.
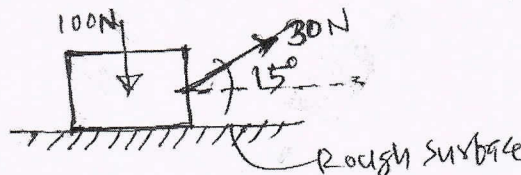

Fig. Q4 (c) **(06 Marks)**

Module-3

5 a. Define a beam and explain the different types of beams and supports. **(08 Marks)**

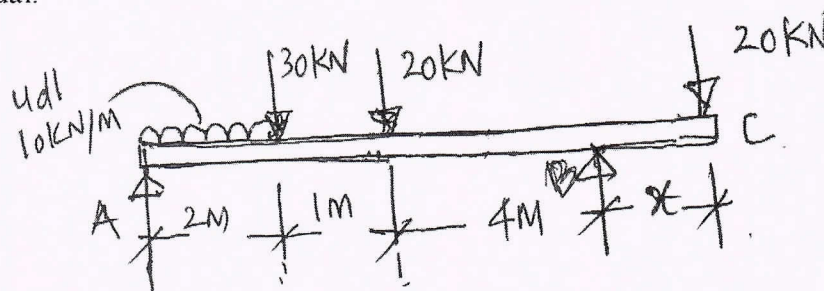b. Obtain the distance x for the beam loaded as shown in Fig. Q5 (b) such that reactions R_A and R_B are equal.

Fig. Q5 (b) **(12 Marks)**

OR

6 a. Give the step by step analysis of a plane truss using the method of sections. **(06 Marks)**

   b. Analyze the forces in the members of the plane truss shown in Fig. Q6 (b) using method of joints.
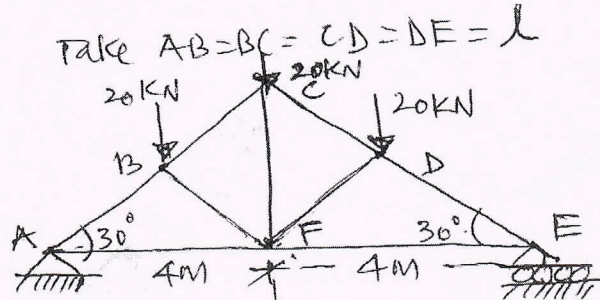

Fig. Q6 (b) **(14 Marks)**

Module-4

7 a. Obtain the location of the centroid for a semi circular area when the diameter AB is horizontal as in Fig. Q7 (a).

Fig. Q7 (a) **(08 Marks)**

   b. Locate the centroid of the composite area shown in Fig.Q7 (b) with respect to point 'O'.
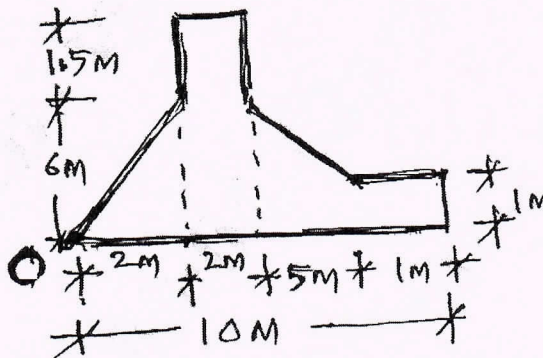

Fig. Q7 (b) **(12 Marks)**

OR

8 a. State and prove the transfer theorem. **(06 Marks)**

   b. Compute the second moment of area for the composite Fig. Q8 (b) about the centroidal horizontal axis. Also find the radius of gyration.
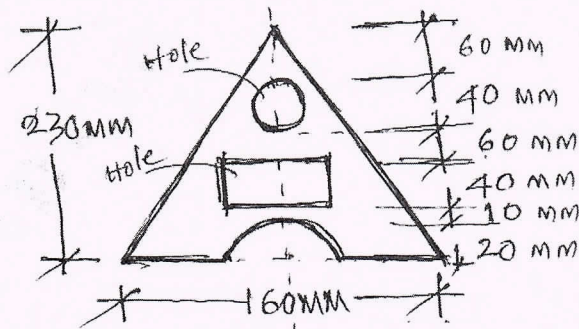

Fig. Q8 (b) **(14 Marks)**

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Module-5

9 a. Define the following :
- (i) Displacement
- (ii) Speed.
- (iii) Velocity
- (iv) Acceleration.   (08 Marks)

b. A burglar's car starts with an acceleration of 2 m/sec^2. A police van reached after 10 seconds and continued to chase the burglar's car with a uniform velocity of 40 m/s. Find the time taken by the police van to overtake the burglar's car.   (08 Marks)

c. State the Newton's Laws of motion.   (04 Marks)

OR

10 a. What is super elevation? Derive the expression for super elevation.   (08 Marks)

b. A stone is dropped down a well with no initial velocity and after 4.5 seconds the splash is heard. Then a second stone is thrown downward with an initial velocity of V_0 and the splash is heard in 4 seconds. If the velocity of sound is constant at 336 m/sec determine the initial velocity of the second stone.   (08 Marks)

c. A Lift carries a weight of 4000 kN and is moving with a uniform acceleration of 3.5 m/sec^2. Determine the tension in the cable when lift is moving upward.   (04 Marks)

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CBCS SCHEME

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BESCK104A/BESCKA104

First Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023
Introduction to Civil Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain briefly civil engineering disciplines.	10	L1	CO1
	b.	List the qualities of good building stone.	10	L1	CO1
		OR			
Q.2	a.	Explain the following: (i) Reinforced Cement Concrete (RCC) (ii) Pre-Stressed Concrete (PSC) (iii) Construction Chemicals	10	L1	CO1
	b.	Explain different types of foundations, briefly.	10	L1	CO1
		Module – 2			
Q.3	a.	Explain concept of (i) Smart city (ii) Clean city	10	L1	CO2
	b.	Explain management of (i) Urban air pollution (ii) Solid waste	10	L1	CO2
		OR			
Q.4	a.	Explain: (i) Energy Efficient Buildings (ii) Temperature Control in Buildings	10	L1	CO2
	b.	Explain: (i) Security System (ii) Smart Buildings	10	L1	CO2
		Module – 3			
Q.5	a.	Explain classification of force system with neat sketches.	10	L1	CO3
	b.	Determine magnitude and direction of "P" for the system shown in Fig.Q5(b). Four coplanar forces acting at a point. One of the forces is unknown. The resultant has a magnitude of 500 N and is acting along x-axis.	10	L3	CO3

Fig.Q5(b)

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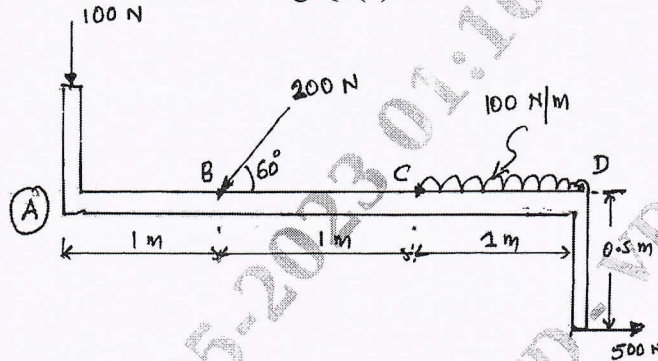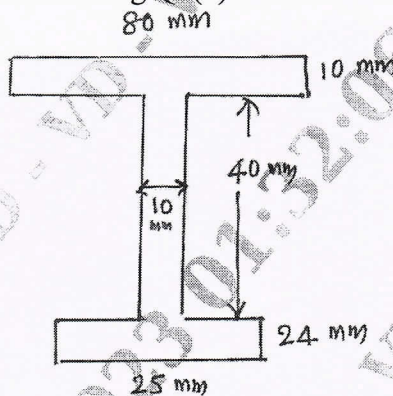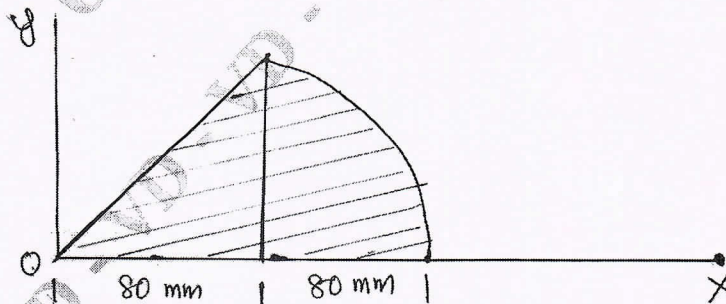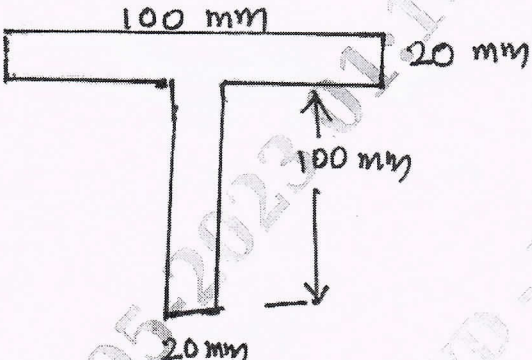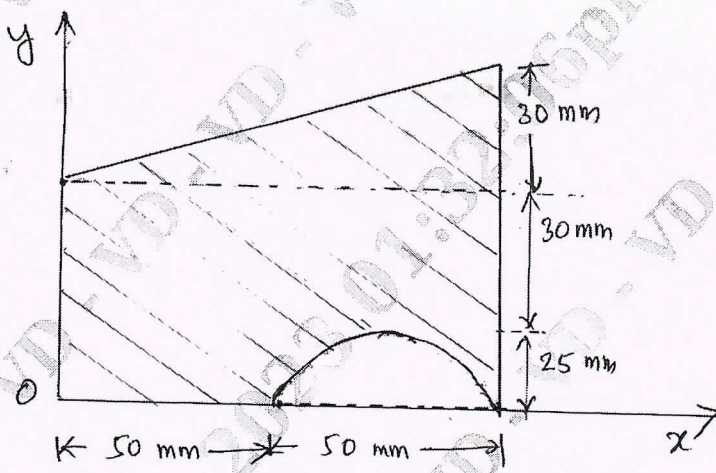|					
		OR			
Q.6	a.	State and prove Varignon's theorem of moments.	10	L3	CO3
	b.	Find the magnitude, direction and position of the resultant force with respect to point 'A' as shown in Fig.Q6(b). Fig.Q6(b)	10	L3	CO3
		Module – 4			
Q.7	a.	Explain the following terms: (i) Centroid (ii) Axis of symmetry (iii) Axis of reference (iv) Centroidial axis (v) Centre of gravity	10	L1	CO4
	b.	Determine the centroid of the Fig.Q7(b) shown below: Fig.Q7(b)	10	L1	CO4
		OR			
Q.8	a.	Prove that for a semicircle $\overline{Y} = \dfrac{4R}{3\pi}$.	10	L1	CO4
	b.	Determine the centroid of area shown in Fig.Q8(b). Fig.Q8(b)	10	L1	CO4

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

		Module – 5			
Q.9	a.	State and prove parallel axis theorem.	10	L1	CO5
	b.	Determine moment of inertia about horizontal centroidal axis for the Fig.Q9(b).	10	L2	CO5

Fig.Q9(b)

		OR			
Q.10	a.	Derive the moment of inertia equation for a rectangle.	10	L1	CO5
	b.	Determine the moment of inertia of the section shown in Fig.Q10(b) with respect to horizontal to horizontal centroidal axis (Ixx).	10	L2	CO5

Fig.Q10(b)

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

First/Second Semester B.E. Degree Examination, Jan./Feb. 2023
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Describe the role of Civil Engineer in the development of nation.   (10 Marks)
   b. List the different fields of Civil Engineering. Explain any four of them.   (10 Marks)

OR

2 a. Describe the building material Brick with neat sketch.   (10 Marks)
   b. Describe the different types of concrete.   (10 Marks)

Module-2

3 a. State and prove parallelogram law of forces.   (08 Marks)
   b. Find the magnitude, direction and position of the resultant with respect to point 'A' for the force system shown in Fig.Q3(b).
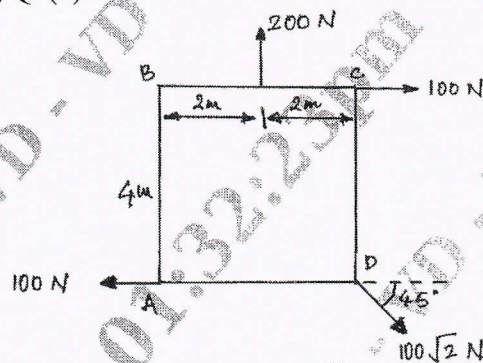

Fig.Q3(b)   (12 Marks)

OR

4 a. State and prove Varignon's theorem.   (08 Marks)
   b. The coefficient of friction are $\mu_s = 0.3$ and $\mu_k = 0.25$ between all surfaces of contact. Determine the smallest force 'P' required to just start block 'D' moving if
      i) Block 'C' restrained by cable AB   ii) Cable AB is removed.
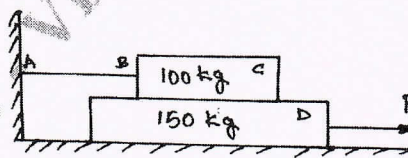   Refer Fig.Q4(b).

Fig.Q4(b)   (12 Marks)

Module-3

5 a. Determine the centroid of triangle by method of integration.   (08 Marks)
   b. Locate the centroid of plane lamina shown in Fig.Q5(b).   (12 Marks)

1 of 3

Fig.Q5(b)

OR
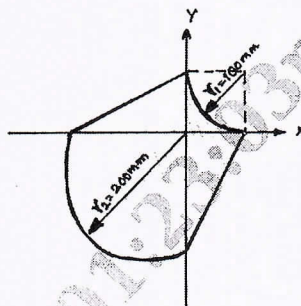
6   a. State and prove Parallel Axis theorem.   (08 Marks)
    b. Determine the Polar moment of inertia for the lamina shown in Fig.Q6(b).

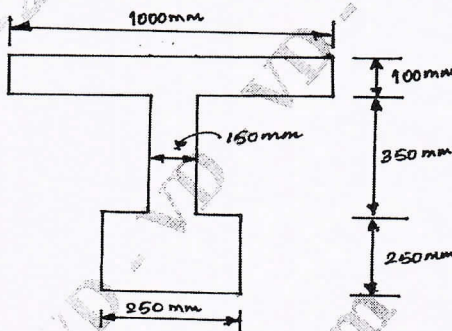Fig.Q6(b)   (12 Marks)

Module-4

7   a. Explain the different types of beams with neat sketches.   (08 Marks)
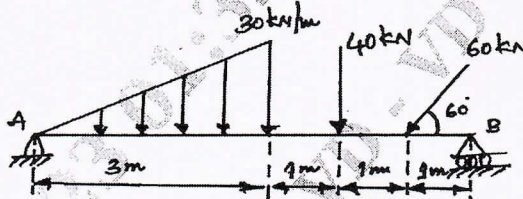   b. Determine the support reactions at A and B for the beam shown in Fig.Q7(b).

Fig.Q7(b)   (12 Marks)

OR

8   a. What are the assumptions made in the analysis of simple truss?   (05 Marks)
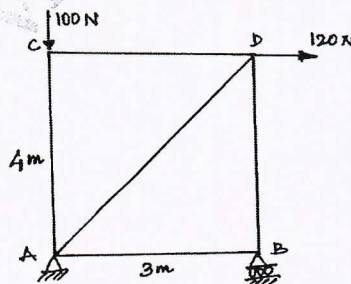   b. Find the support reactions and member forces for the pin jointed plane truss shown in Fig.Q8(b).

Fig.Q8(b)   (15 Marks)

2 of 3

Module-5

9 a. Derive all the three equations of motion in kinematics. **(06 Marks)**

b. The motion of a particle is defined by the relation $x = t^2 - (t - 3)^2$ m where x and t are in meters and seconds respectively. Determine (i) The time when velocity is maximum (ii) the position and maximum velocity. **(06 Marks)**

c. A stone is thrown upward with a velocity of 40m/s. Determine the time of the stone when it is at a height of 10m and is moving downwards. **(08 Marks)**

OR

10 a. Explain the D'Alembert's principle. **(06 Marks)**

b. A projectile is launched from a gun, after 3.783 seconds, the velocity of the projectile is observed to make an angle of 30° with the horizontal and at 4.79 seconds it reaches its maximum height, Calculate the initial velocity and angle of projection. **(06 Marks)**

c. A hockey player hits a pack so that it comes to rest in 9 seconds after sliding 30m, horizontally on the ice. Determine
   i) The initial velocity of the Puck.
   ii) The coefficient if friction between puck and ice. **(08 Marks)**

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN | | | | | | | | | | 21CIV14/24

First/Second Semester B.E. Degree Examination, Jan./Feb. 2023
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Describe the role of Civil Engineer in the development of nation. **(10 Marks)**
   b. List the different fields of Civil Engineering. Explain any four of them. **(10 Marks)**

OR

2 a. Describe the building material Brick with neat sketch. **(10 Marks)**
   b. Describe the different types of concrete. **(10 Marks)**

Module-2

3 a. State and prove parallelogram law of forces. **(08 Marks)**
   b. Find the magnitude, direction and position of the resultant with respect to point 'A' for the force system shown in Fig.Q3(b).

Fig.Q3(b)   **(12 Marks)**

OR

4 a. State and prove Varignon's theorem. **(08 Marks)**
   b. The coefficient of friction are $\mu_s = 0.3$ and $\mu_k = 0.25$ between all surfaces of contact. Determine the smallest force 'P' required to just start block 'D' moving if
   i) Block 'C' restrained by cable AB   ii) Cable AB is removed.
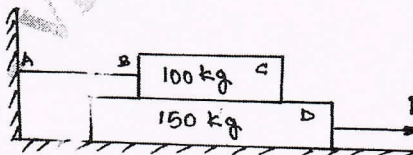   Refer Fig.Q4(b).

Fig.Q4(b)   **(12 Marks)**

Module-3

5 a. Determine the centroid of triangle by method of integration. **(08 Marks)**
   b. Locate the centroid of plane lamina shown in Fig.Q5(b). **(12 Marks)**
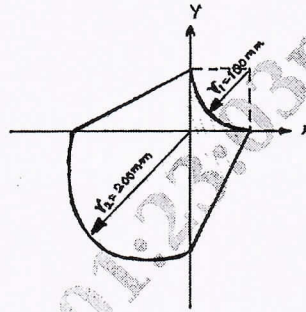
1 of 3

Fig.Q5(b)

OR

6 a. State and prove Parallel Axis theorem. **(08 Marks)**
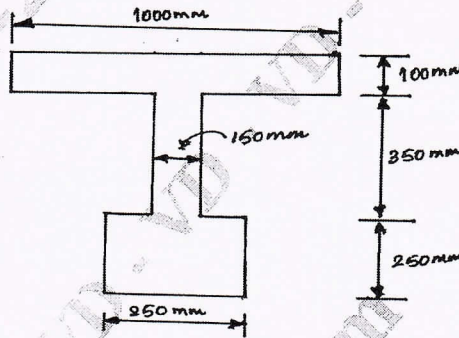   b. Determine the Polar moment of inertia for the lamina shown in Fig.Q6(b).

Fig.Q6(b) **(12 Marks)**

Module-4

7 a. Explain the different types of beams with neat sketches. **(08 Marks)**
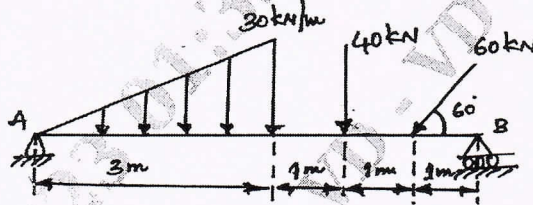   b. Determine the support reactions at A and B for the beam shown in Fig.Q7(b).

Fig.Q7(b) **(12 Marks)**

OR

8 a. What are the assumptions made in the analysis of simple truss? **(05 Marks)**
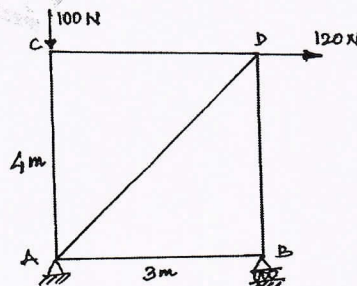   b. Find the support reactions and member forces for the pin jointed plane truss shown in Fig.Q8(b).

Fig.Q8(b) **(15 Marks)**

2 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal   **Page 15 of 48**

Module-5

9 a. Derive all the three equations of motion in kinematics. **(06 Marks)**

b. The motion of a particle is defined by the relation $x = t^2 - (t - 3)^2$ m where x and t are in meters and seconds respectively. Determine (i) The time when velocity is maximum (ii) the position and maximum velocity. **(06 Marks)**

c. A stone is thrown upward with a velocity of 40m/s. Determine the time of the stone when it is at a height of 10m and is moving downwards. **(08 Marks)**

OR

10 a. Explain the D'Alembert's principle. **(06 Marks)**

b. A projectile is launched from a gun, after 3.783 seconds, the velocity of the projectile is observed to make an angle of 30° with the horizontal and at 4.79 seconds it reaches its maximum height, Calculate the initial velocity and angle of projection. **(06 Marks)**

c. A hockey player hits a pack so that it comes to rest in 9 seconds after sliding 30m, horizontally on the ice. Determine
   i) The initial velocity of the Puck.
   ii) The coefficient if friction between puck and ice. **(08 Marks)**

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

CBCS SCHEME

USN | | | | | | | | | |

BESCKA104/BESCK104A

First Semester B.E./B.Tech. Degree Examination, June/July 2023
Introduction to Civil Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explicate the scope of following fields of civil engineering : (i) Surveying (ii) Geotechnical engineering (iii) Transportation engineering	6	L1	CO1
	b.	Explicate brick. What are the good qualities of bricks.	4	L1	CO1
	c.	Explicate and enumerate the functions of following : (i) Chejja (ii) Column (iii) Foundation (iv) Lintel (v) Plinth	10	L1	CO1
		OR			
Q.2	a.	Explicate the scope of following fields of civil engineering : (i) Structural engineering (ii) Water resource engineering (iii) Environmental engineering (iv) Construction planning and Project management	8	L1	CO1
	b.	Explicate cement. Enumerate different types of cements used in construction.	3	L1	CO1
	c.	Explicate the following : (i) Reinforced cement concrete and its advantages. (ii) Prestressed concrete and its uses. (iii) Plain cement concrete and materials used for plain cement concrete.	9	L1	CO1
		Module – 2			
Q.3	a.	Explicate the different sustainable development goals of 2030 came into force.	8	L1	CO2
	b.	Explicate smart city. Enumerate the smart city concepts.	6	L1	CO2
	c.	Explicate the following : (i) Energy efficient buildings and aspects of energy efficient buildings. (ii) Temperature controls in buildings and methods followed to control temperature.	6	L1	CO2
		OR			

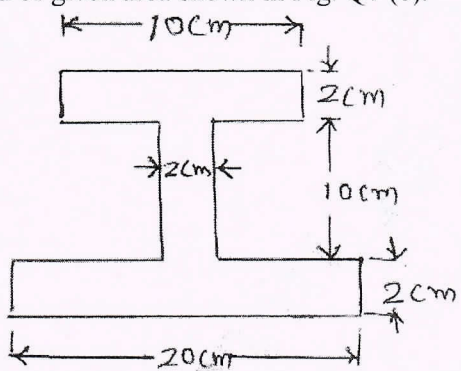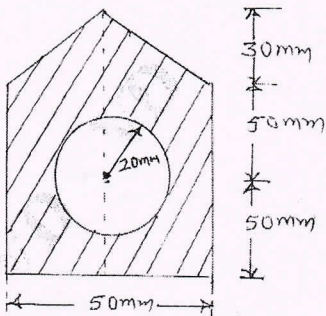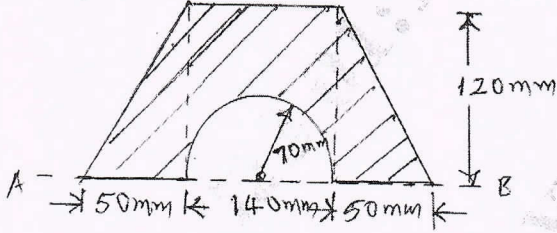| Q.4	a.	Explicate the following : (i) Clean city concept and its importance. (ii) Safe city concept and its requirement. (iii) Water supply and types of water supply systems.	9	L1	CO2
	b.	Explicate the causes and effects of air pollution.	4	L1	CO2
	c.	Describe the sources of solid waste. Enumerate different solid waste disposal methods.	7	L1	CO2
Module – 3
Q.5	a.	Explicate the following : (i) Basic idealization of mechanics. (ii) Principle of transmissibility of force. (iii) Force and components of a force.	6	L2	CO3
	b.	State and prove parallelogram law of forces.	6	L2	CO3
	c.	Determine the resultant force and its inclination for the force system shown in Fig. Q5 (c). Fig. Q5 (c)	8	L3	CO3
OR
Q.6	a.	State and prove Verignon's theorem.	8	L2	CO3
	b.	Enumerate different types of force systems.	6	L2	CO3
	c.	The system of forces acting on triangular plate are shown in the Fig.Q6 (c). Determine the magnitude of the resultant and its inclination. Fig. Q6 (c)	6	L3	CO3
Module – 4
Q.7	a.	Explicate : (i) Centroid (ii) Center of gravity.	2	L2	CO4
	b.	Derive centroid of a triangle of base width 'b' and height 'h' from first principles.	10	L2	CO4
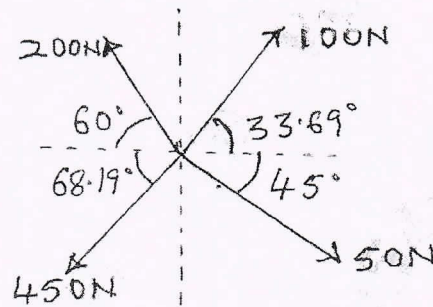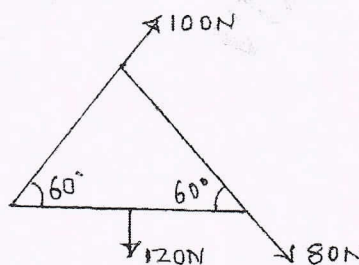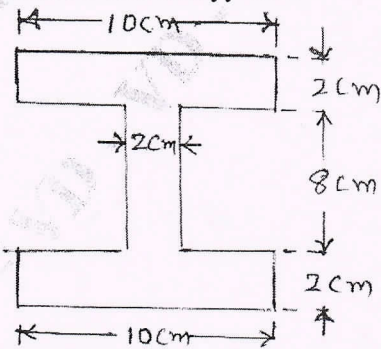
2 of 4

	c.	Determine centroid of given area shown in Fig. Q7 (c).	8	L3	CO4

Fig. Q7 (c)

		OR			
Q.8	a.	Explicate the axis of symmetry.	2	L2	CO4
	b.	Derive expression for centroid of a semi-circle of radius R from first principles.	10	L2	CO4
	c.	Determine centroid of hatched area of the plane shown in Fig. Q8 (c).	8	L3	CO4

Fig. Q8 (c)

Module – 5

Q.9	a.	State and prove parallel axis theorem.	6	L2	CO5
	b.	Derive expression for moment of inertia of a quarter circle having radius R from first principles.	6	L2	CO5
	c.	Determine moment of inertia and radius of gyration of the section shown in Fig. Q9 (c) about centroidal xx-axis and yy-axis.	8	L3	CO5

Fig. Q9 (c)

3 of 4

		OR			
Q.10	a.	State and prove perpendicular axis theorem.	6	L2	CO5
	b.	Derive moment of inertia of a triangle from first principles.	8	L2	CO5
	c.	Determine the moment of inertia of a plane lamina shown in Fig. Q10 (c) about AB for hatched portion.	6	L3	CO5

Fig. Q10 (c)

* * * * *

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CBCS SCHEME

USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   18CIV14/24

First/Second Semester B.E. Degree Examination, June/July 2023
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain briefly the scope of any two following fields of engineering:
(i) Geotechnical Engineering   (ii) Water Resources Engineering
(iii) Environmental Engineering   **(06 Marks)**

b. Differentiate between : (i) Statics and dynamics
(ii) Couple and Moment
(iii) Concurrent and Non-concurrent forces
(iv) Coplanar and Non-coplanar forces   **(08 Marks)**

c. Transfer the force F acting at point A to point B. [Refer Fig.Q1(c)]
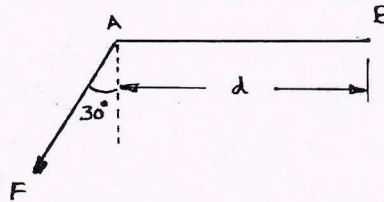
Fig.Q1(c)   **(06 Marks)**

OR

2 a. Determine the resultant of the force system with respect to point B. [Refer Fig.Q2(a)]
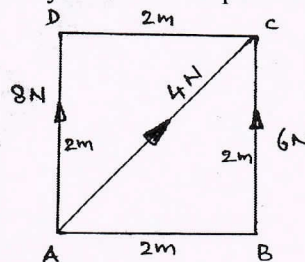

Fig.Q2(a)   **(06 Marks)**

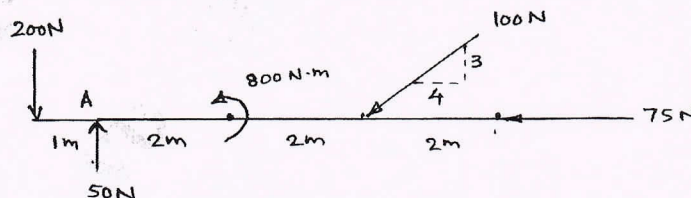b. Replace the system of forces and couple in Fig.Q2(b) by a single force couple system at A.

Fig.Q2(b)   **(08 Marks)**

c. Explain characteristics of a force.   **(06 Marks)**

Module-2

3 a. State and prove Lami's theorem.   **(08 Marks)**

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b. Find the forces in all he wires (AB, BC and CD) and the load W_1 to keep the wire BC horizontal. Take W_2 = 1000 N. [Refer Fig.Q3(b)]
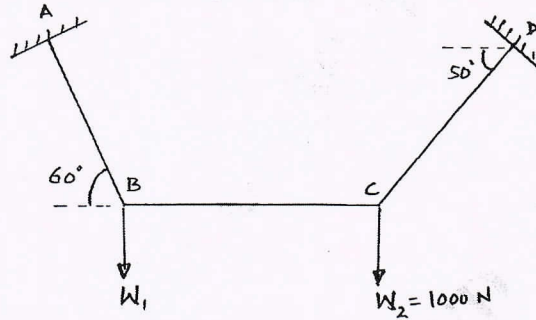
Fig.Q3(b) **(08 Marks)**

c. What is cone of friction? Explain. **(04 Marks)**

OR

4 a. What are different types of friction? Explain. **(04 Marks)**

b. A ladder 3m in length and weighing 200N is place on a rough wall at an inclination of 60° as shown in Fig.Q4(b). The coefficient of friction between ladder and wall is 0.28 and between ladder and floor is 0.34. A man weighing 600N is to reach to the top of the ladder. Calculate the horizontal force to be applied at the floor level to prevent the ladder from slipping.
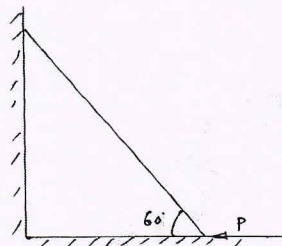
Fig.Q4(b) **(08 Marks)**

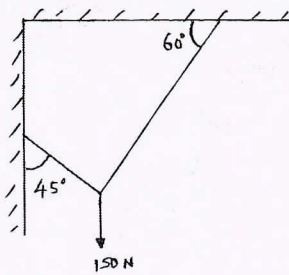c. Find the forces developed in the wires supporting an electric fixture as shown in Fig.Q4(c).

Fig.Q4(c) **(08 Marks)**

Module-3

5 a. Briefly explain different types of supports. **(04 Marks)**

b. Determine the support reactions for the beam supported and loaded as shown in Fig.Q5(b).
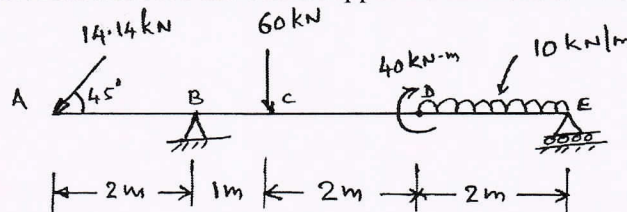
Fig.Q5(b) **(08 Marks)**

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c. Analyse the truss shown in Fig.Q5(c) by method of joints. Tabulate the results and indicate the nature of forces in each member.
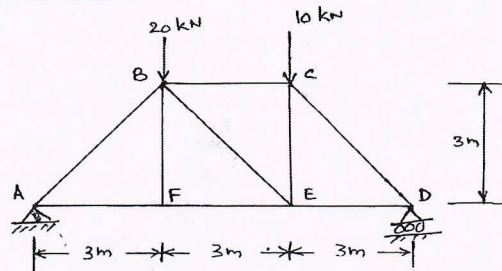

Fig.Q5(c)   **(08 Marks)**

OR

6 a. Explain method of sections to analyse the plane frames.   **(04 Marks)**

b. A beam 20m long supported on two intermediate supports, 12m apart, carries an u.d.l. of 6 kN/m and two concentrated loads of 30 kN at left end A and 50 kN at right end B as shown in Fig.Q6(b). How far away should the support C be located from end A so that the reactions at both the supports are equal?
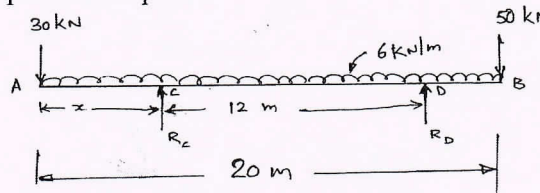

Fig.Q6(b)   **(08 Marks)**

c. Determine the forces in the members BD, CD and CE in the truss shown in Fig.Q6(c).
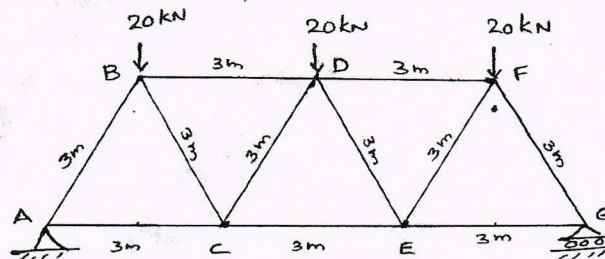

Fig.Q6(c)   **(08 Marks)**

Module-4

7 a. Show that the centroid of a semicircle is at a distance of $\dfrac{4r}{3\pi}$ from the diametrical axis from first principles.   **(04 Marks)**

b. Find the coordinates of the centroid of the shaded area with respect to the axes shown in Fig.Q7(b).
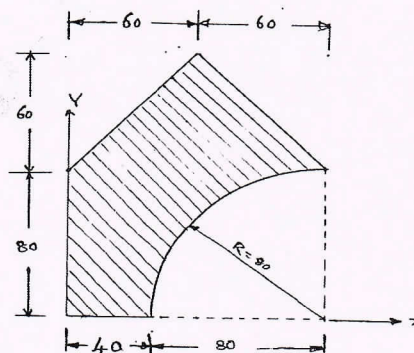

Fig.Q7(b) : All dimensions are in mm   **(08 Marks)**

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c. Determine the moment of inertia of the lamina about its x-axis.[Refer Fig.Q7(c)]
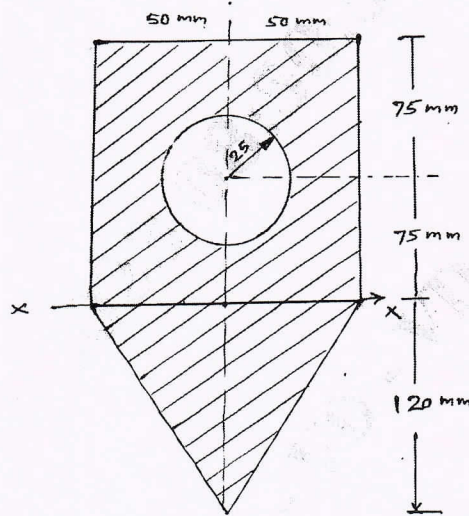

Fig.Q7(c)   **(08 Marks)**

OR

8 a. Show that the moment of inertia of a rectangle with width b and depth d about its centroidal
   x-axis is $\dfrac{bd^3}{12}$ from first principles.   **(04 Marks)**

   b. Locate the centroid of the lamina shown in Fig.Q8(b).
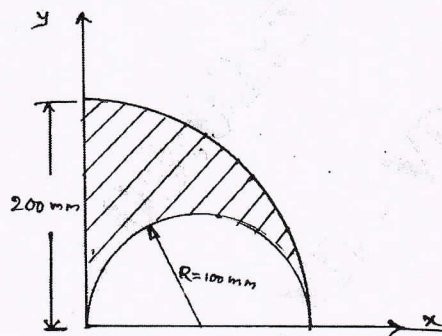

Fig.Q8(b)   **(08 Marks)**

   c. Find the moment of inertia along the horizontal and vertical axis passing through the
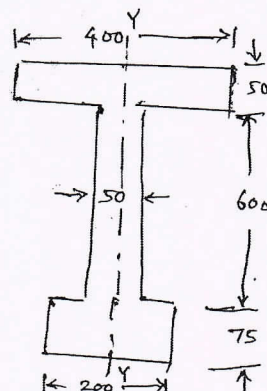   centroid of the section shown in Fig.Q8(c).


Fig.Q8(c)   All dimensions are in mm   **(08 Marks)**

Module-5

9 a. Differentiate : (i) Kinetics and Kinematics   (ii) Velocity and speed   **(04 Marks)**

b. Two stations P and Q are 5.2 km apart. An automobile starts from rest from station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at station Q with a retardation of 1 m/s. Determine the total time required to cover the distance between these two stations.   **(08 Marks)**

c. Derive the expression for the time required to reach the maximum height of a projectile and hence show that the horizontal range as $\left(\dfrac{n^2 \sin 2\alpha}{g}\right)$.   **(08 Marks)**

OR

10 a. Explain D'Alembert's principle.   **(04 Marks)**

b. A boy throws a ball so that it may just clear a wall 4m high. The boy is at a distance of 5m from the wall. The ball was found to hit the ground at a distance of 4m on the other side of the wall as shown in Fig.Q10(b). Find the velocity of projection of the ball and the angle of projection.
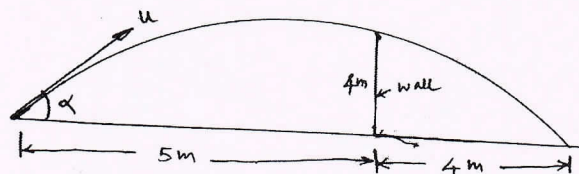
(Figure not to scale)
Fig.Q10(b)   **(08 Marks)**

c. A police officer observes a car approaching at the unlawful speed of 60 kmph. He gets on his motorcycle and starts chasing the car, just as it passes in front of him. After accelerating it for 10 sec., at a constant rate, the officer reaches his top speed of 75 kmph. How long does it take the officer to overtake the car from the time he started?   **(08 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

21CIV14

First Semester B.E./B.Tech. Degree Examination, Feb./Mar. 2022
Elements of Civil Engineering and Mechanics

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Briefly explain the scopes of Branches :
    i)   Construction technology   ii)   Water resources and Irrigation Engineering. **(10 Marks)**
   b. What are the roles of a Civil Engineer in Infrastructural development of a Country?
       (05 Marks)
   c. What are the requirements of a good stone? **(05 Marks)**
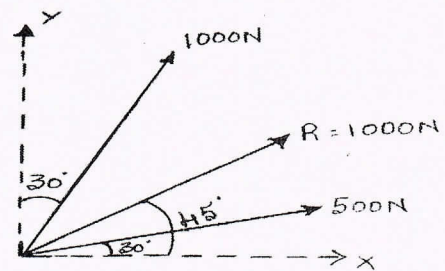
OR

2 a. How does GIS work? What are the different ways of using GIS in Business and everyday life? **(10 Marks)**
   b. What are the requirements of a good Brick? **(05 Marks)**
   c. What are advantages and disadvantages of wood? **(05 Marks)**

Module-2

3 a. State and prove Varignon's theorem. **(06 Marks)**
   b. Two forces acting on a body are 500N and 1000N as shown in Fig. Q3(b). Determine the third force F such that the resultant of all the three forces are 1000N directed at 45° to the X - axis. **(06 Marks)**

Fig. Q3(b)

   c. A system of cables in equilibrium condition under two vertical loads of 300N and 500N as shown in Fig. Q3(c). Determine the forces developed in the different segments. **(08 Marks)**
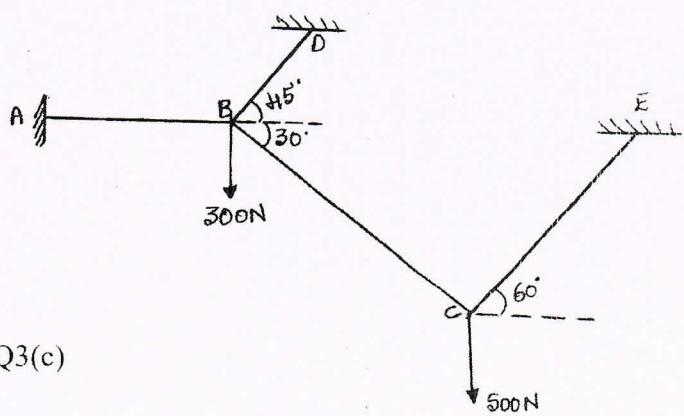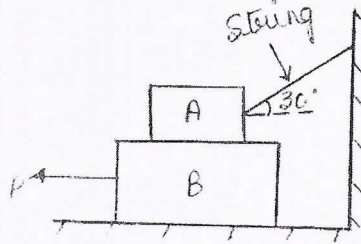

Fig. Q3(c)

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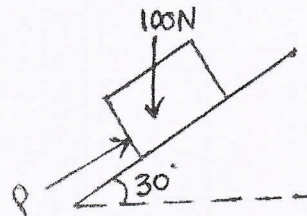
OR

4 a. Briefly explain :
    i) Angle of friction   ii) Coefficient of friction   iii) Angle of repose. **(06 Marks)**

  b. Find the force P first required to slide block B as shown in Fig. Q4(b). Find also the tension in the string. Take weight of block A = 500N , Weight of Block B = 1000N , μ = 0.2 (for all contact surface). **(06 Marks)**

Fig. Q4(b)

  c. Find the value of P so that the body will not impend down the plane as shown in Fig. Q4(c). Also find the value of P for the body to impend up the plane. Take μ = 0.3. **(08 Marks)**
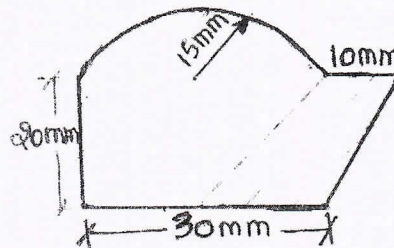
Fig. Q4(c)

Module-3

5 a. Derive the expression for Centroid of a semi – circle from First principle. **(08 Marks)**

  b. Determine the centroid of a shaded area of composite section as shown in Fig. Q5(b). **(12 Marks)**
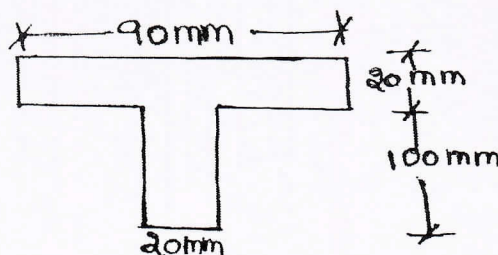
Fig. Q5(b)

OR

6 a. State and prove perpendicular axes theorem. **(08 Marks)**

  b. Find the second moment of area as shown in Fig. Q6(b) about horizontal , vertical centroidal axis. **(12 Marks)**
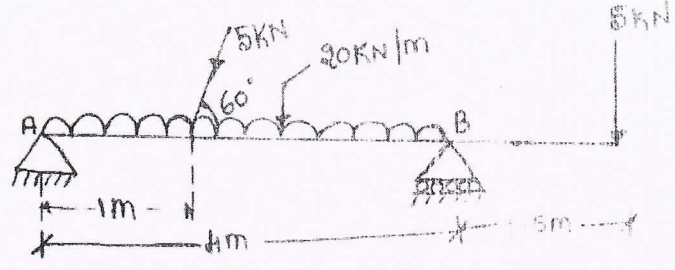
Fig. Q6(b)

Module-4

7 a. Explain different types of supports and loads with neat sketch. **(10 Marks)**
   b. Find the support reaction for the beam as shown in Fig. Q7(b). **(10 Marks)**
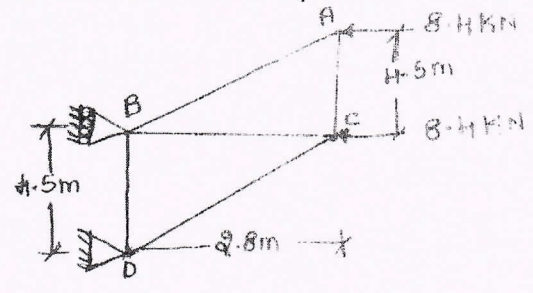
Fig. Q7(b)

OR

8 a. List the different types of Trusses. What are the assumptions made in the analysis of Trusses? **(10 Marks)**
   b. Determine the force in each member of truss as shown in Fig. Q8(b) using method of joints. Also state whether each member is in tension or compression. **(10 Marks)**

Fig. Q8(b)

Module-5

9 a. What is Super Elevation? State the importance of Super Elevation. **(04 Marks)**
   b. A Burglar's car starts with an acceleration of $2m/sec^2$. A police van came after 10 sec and continued to chase the Burglar's car with an uniform velocity of 40m/sec. Find the time taken by the police van to overtake the Burglar's car. **(08 Marks)**
   c. A stone 'A' is dropped from top of a tower 50m height. At the same time another stone 'B' is thrown up from the foot of the tower with the velocity of 25m/sec. At what distance from the top and after how much time the two stones will cross each other. **(08 Marks)**

OR

10 a. State and explain D'Alembert's principle. **(04 Marks)**
   b. The equation for the angle of rotation 'θ' is given by $\theta = 2t^3 - 5t^2 - 8t + 6$, where 't' is the time taken in seconds. Find i) The angular velocity   ii) Angular acceleration of the body when t = 0 and t = 5 secs. **(08 Marks)**
   c. A projectile is fired at certain angle with the horizontal has a horizontal range of 3.5km. If the maximum height reached is 500m, what is the angle of elevation of the Cannon? What was the Muzzle velocity of the projectile? **(08 Marks)**

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

2

USN | | | | | | | | | |

First Semester B.E./B.Tech. Degree Examination, Feb./Mar. 2022
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Briefly explain the scopes of Branches :
       i)   Construction technology   ii) Water resources and Irrigation Engineering. **(10 Marks)**
   b. What are the roles of a Civil Engineer in Infrastructural development of a Country?
                                                                                            (05 Marks)
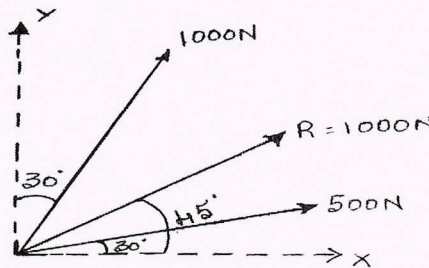   c. What are the requirements of a good stone?   **(05 Marks)**

OR

2 a. How does GIS work? What are the different ways of using GIS in Business and everyday life? **(10 Marks)**
   b. What are the requirements of a good Brick?   **(05 Marks)**
   c. What are advantages and disadvantages of wood?   **(05 Marks)**

Module-2

3 a. State and prove Varignon's theorem.   **(06 Marks)**
   b. Two forces acting on a body are 500N and 1000N as shown in Fig. Q3(b). Determine the third force F such that the resultant of all the three forces are 1000N directed at 45° to the X - axis. **(06 Marks)**

Fig. Q3(b)

   c. A system of cables in equilibrium condition under two vertical loads of 300N and 500N as shown in Fig. Q3(c). Determine the forces developed in the different segments.   **(08 Marks)**
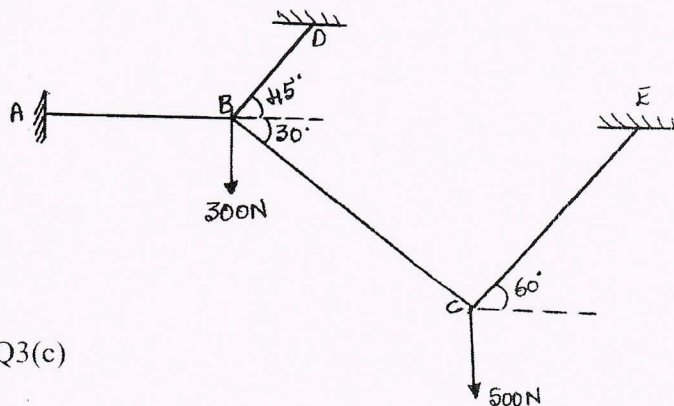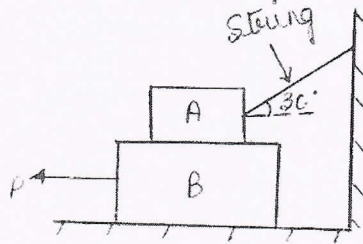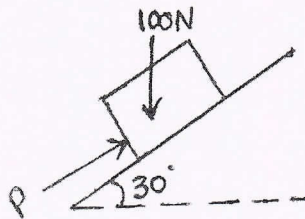

Fig. Q3(c)

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OR

4 a. Briefly explain :
   i) Angle of friction   ii) Coefficient of friction   iii) Angle of repose.   **(06 Marks)**

   b. Find the force P first required to slide block B as shown in Fig. Q4(b). Find also the tension in the string. Take weight of block A = 500N , Weight of Block B = 1000N , μ = 0.2 (for all contact surface).   **(06 Marks)**

Fig. Q4(b)

   c. Find the value of P so that the body will not impend down the plane as shown in Fig. Q4(c). Also find the value of P for the body to impend up the plane. Take μ = 0.3.   **(08 Marks)**
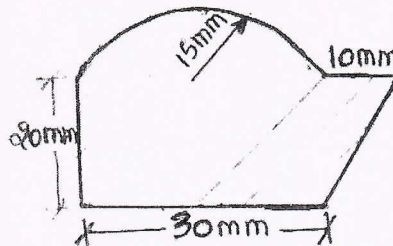
Fig. Q4(c)

Module-3

5 a. Derive the expression for Centroid of a semi – circle from First principle.   **(08 Marks)**

   b. Determine the centroid of a shaded area of composite section as shown in Fig. Q5(b).   **(12 Marks)**
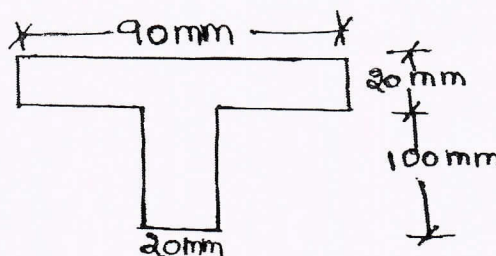
Fig. Q5(b)

OR

6 a. State and prove perpendicular axes theorem.   **(08 Marks)**

   b. Find the second moment of area as shown in Fig. Q6(b) about horizontal , vertical centroidal axis.   **(12 Marks)**
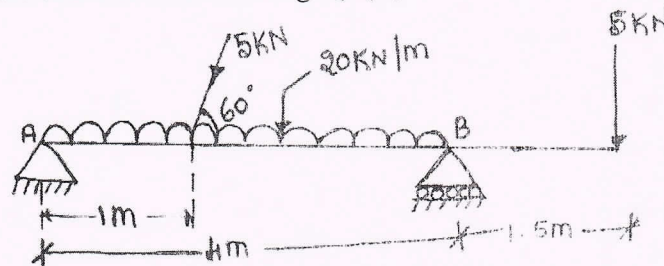
Fig. Q6(b)

2 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal   **Page 30 of 48**
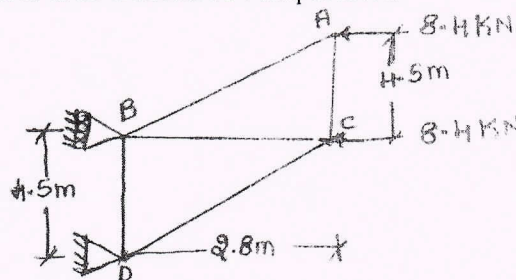
Module-4

7 a. Explain different types of supports and loads with neat sketch. (10 Marks)
   b. Find the support reaction for the beam as shown in Fig. Q7(b). (10 Marks)

Fig. Q7(b)

OR

8 a. List the different types of Trusses. What are the assumptions made in the analysis of Trusses? (10 Marks)
   b. Determine the force in each member of truss as shown in Fig. Q8(b) using method of joints. Also state whether each member is in tension or compression. (10 Marks)

Fig. Q8(b)

Module-5

9 a. What is Super Elevation? State the importance of Super Elevation. (04 Marks)
   b. A Burglar's car starts with an acceleration of $2m/sec^2$. A police van came after 10 sec and continued to chase the Burglar's car with an uniform velocity of 40m/sec. Find the time taken by the police van to overtake the Burglar's car. (08 Marks)
   c. A stone 'A' is dropped from top of a tower 50m height. At the same time another stone 'B' is thrown up from the foot of the tower with the velocity of 25m/sec. At what distance from the top and after how much time the two stones will cross each other. (08 Marks)

OR

10 a. State and explain D'Alembert's principle. (04 Marks)
   b. The equation for the angle of rotation 'θ' is given by $0 = 2t^3 - 5t^2 + 8t + 6$, where 't' is the time taken in seconds. Find i) The angular velocity   ii) Angular acceleration of the body when t = 0 and t = 5 secs. (08 Marks)
   c. A projectile is fired at certain angle with the horizontal has a horizontal range of 3.5km. If the maximum height reached is 500m, what is the angle of elevation of the Cannon? What was the Muzzle velocity of the projectile? (08 Marks)

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐

21CIV14

First Semester B.E./B.Tech. Degree Examination, Feb./Mar. 2022
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Briefly explain the scopes of Branches :
   i) Construction technology   ii) Water resources and Irrigation Engineering. **(10 Marks)**
   b. What are the roles of a Civil Engineer in Infrastructural development of a Country?
   (05 Marks)
   c. What are the requirements of a good stone? **(05 Marks)**

OR

2 a. How does GIS work? What are the different ways of using GIS in Business and everyday life? **(10 Marks)**
   b. What are the requirements of a good Brick? **(05 Marks)**
   c. What are advantages and disadvantages of wood? **(05 Marks)**

Module-2

3 a. State and prove Varignon's theorem. **(06 Marks)**
   b. Two forces acting on a body are 500N and 1000N as shown in Fig. Q3(b). Determine the third force F such that the resultant of all the three forces are 1000N directed at 45° to the X - axis. **(06 Marks)**

Fig. Q3(b)

   c. A system of cables in equilibrium condition under two vertical loads of 300N and 500N as shown in Fig. Q3(c). Determine the forces developed in the different segments. **(08 Marks)**
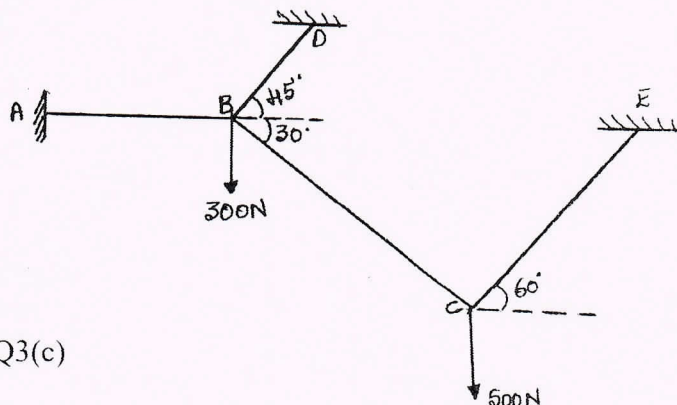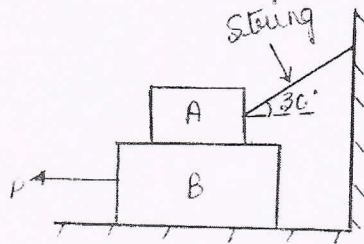

Fig. Q3(c)

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal
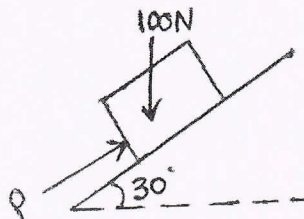
OR

4 a. Briefly explain :
      i) Angle of friction   ii) Coefficient of friction   iii) Angle of repose.   **(06 Marks)**
   b. Find the force P first required to slide block B as shown in Fig. Q4(b). Find also the tension in the string. Take weight of block A = 500N , Weight of Block B = 1000N , μ = 0.2 (for all contact surface).   **(06 Marks)**

Fig. Q4(b)

   c. Find the value of P so that the body will not impend down the plane as shown in Fig. Q4(c). Also find the value of P for the body to impend up the plane. Take μ = 0.3.   **(08 Marks)**
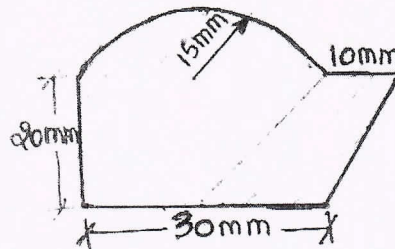
Fig. Q4(c)

Module-3

5 a. Derive the expression for Centroid of a semi – circle from First principle.   **(08 Marks)**
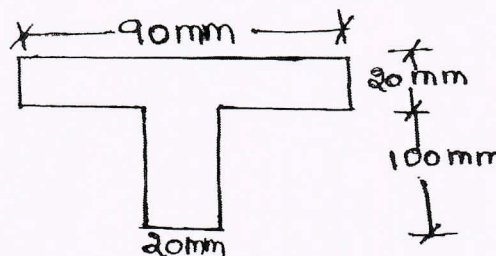   b. Determine the centroid of a shaded area of composite section as shown in Fig. Q5(b).   **(12 Marks)**

Fig. Q5(b)

OR

6 a. State and prove perpendicular axes theorem.   **(08 Marks)**
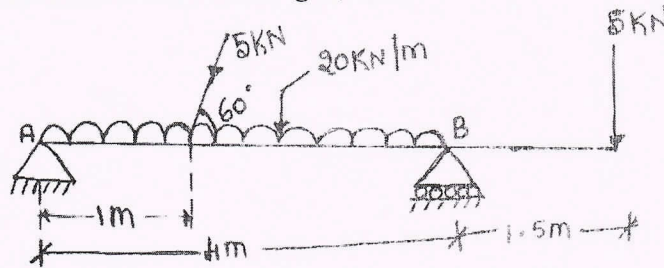   b. Find the second moment of area as shown in Fig. Q6(b) about horizontal , vertical centroidal axis.   **(12 Marks)**

Fig. Q6(b)

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

Module-4

7 a. Explain different types of supports and loads with neat sketch. (10 Marks)
   b. Find the support reaction for the beam as shown in Fig. Q7(b). (10 Marks)
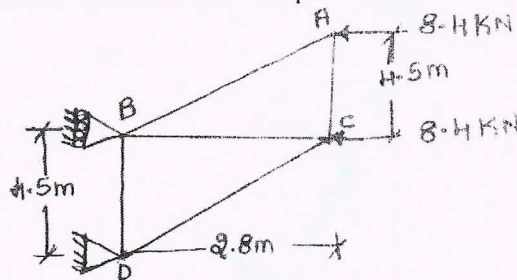
Fig. Q7(b)

OR

8 a. List the different types of Trusses. What are the assumptions made in the analysis of Trusses? (10 Marks)
   b. Determine the force in each member of truss as shown in Fig. Q8(b) using method of joints. Also state whether each member is in tension or compression. (10 Marks)

Fig. Q8(b)

Module-5

9 a. What is Super Elevation? State the importance of Super Elevation. (04 Marks)
   b. A Burglar's car starts with an acceleration of 2m/sec^2. A police van came after 10 sec and continued to chase the Burglar's car with an uniform velocity of 40m/sec. Find the time taken by the police van to overtake the Burglar's car. (08 Marks)
   c. A stone 'A' is dropped from top of a tower 50m height. At the same time another stone 'B' is thrown up from the foot of the tower with the velocity of 25m/sec. At what distance from the top and after how much time the two stones will cross each other. (08 Marks)

OR

10 a. State and explain D'Alembert's principle. (04 Marks)
   b. The equation for the angle of rotation 'θ' is given by $0 = 2t^3 - 5t^2 + 8t + 6$, where 't' is the time taken in seconds. Find i) The angular velocity   ii) Angular acceleration of the body when t = 0 and t = 5 secs. (08 Marks)
   c. A projectile is fired at certain angle with the horizontal has a horizontal range of 3.5km. If the maximum height reached is 500m, what is the angle of elevation of the Cannon? What was the Muzzle velocity of the projectile? (08 Marks)

* * * * *

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

MAKE-UP EXAM

USN | | | | | | | | | |

First Semester B.E./B.Tech. Degree Examination, Nov./Dec. 2023
## Introduction to Civil Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
*2. M : Marks , L: Bloom's level , C: Course outcomes.*

		Module – 1	M	L	C
Q.1	a.	Briefly explain the scopes of Branches : i) Surveying ii) Structural Engineering.	10	L1	CO1
	b.	Write the requirements of a good bricks.	5	L1	CO1
	c.	Write a short note on Foundation.	5	L1	CO1
		OR			
Q.2	a.	Briefly explain the scopes of Branches : i) Transportation Engineering ii) Environmental Engineering.	10	L1	CO1
	b.	Briefly explain RCC and PCC.	5	L1	CO1
	c.	Write a short note on Column.	5	L1	CO1
		Module – 2			
Q.3	a.	Briefly explain the concept of Smart City and Clean City.	10	L1	CO2
	b.	Write a short note on Solid Waste Management.	5	L1	CO2
	c.	List any 2 common recyclable items. Explain.	5	L1	CO2
		OR			
Q.4	a.	Briefly explain : i) Safe city concept ii) Sustainable development goals.	10	L1	CO2
	b.	Write a short note on Urban Air Pollution.	5	L1	CO2
	c.	Define Smart buildings. Write the uses of Smart buildings.	5	L1	CO2
		Module – 3			
Q.5	a.	State and prove Law of Parallelogram of forces.	6	L2	CO3
	b.	Explain principle of Transmissibility of forces with a neat sketch.	6	L2	CO3
	c.	Determine the magnitude, direction and point of application from O of the resultant force as shown in Fig. Q5(c).	8	L3	CO3

Fig. Q5(c)

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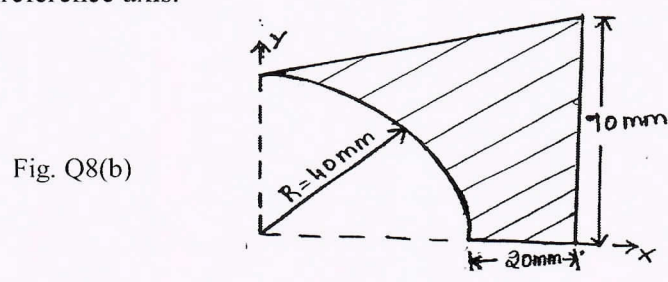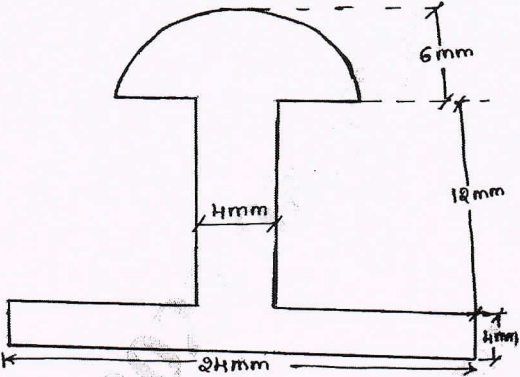|		OR			
Q.6	a.	State and prove Varignon's theorem.	6	L2	CO3
	b.	Explain Free Body diagram with a neat sketch.	6	L2	CO3
	c.	Determine the resultant of four concurrent force system acting as shown in Fig. Q6(c).	8	L3	CO3

Fig. Q6(c)
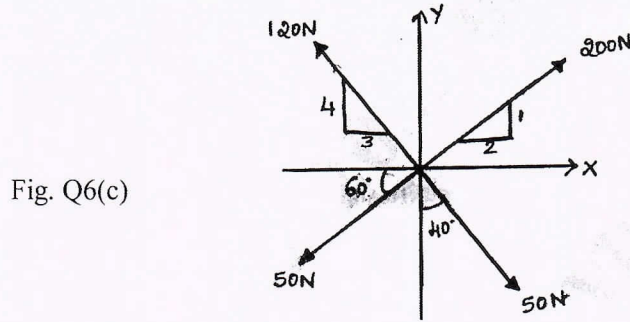
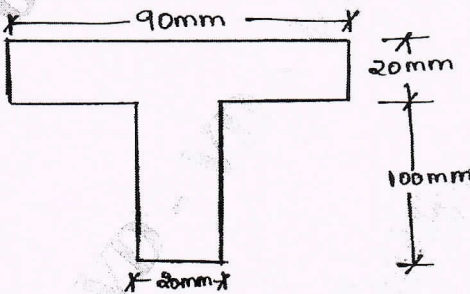|		Module – 4			
Q.7	a.	Derive the expression for the centroid of a semi – circle from the first principle.	10	L2	CO4
	b.	Determine the centroid for the Fig. Q7(b), shown below with respect to given reference axis.	10	L3	CO4

Fig. Q7(b)
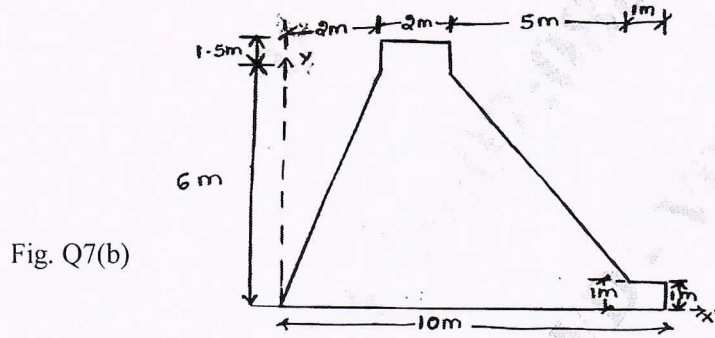
		OR			
Q.8	a.	Derive the expression for a centroid of a Right angle triangle from the first principle.	10	L2	CO4
	b.	Determine the centroid for the fig. Q8(b), shown below with respect to given reference axis.	10	L3	CO4

Fig. Q8(b)

		Module – 5			
Q.9	a.	State and prove Parallel Axis theorem.	10	L2	CO5

	b.	Calculate the polar radius of gyration for the area as shown in Fig. Q9(b) below.	10	L3	CO5

Fig. Q9(b)

		OR			
Q.10	a.	State and prove Perpendicular Axis theorem.	10	L2	CO5
	b.	Calculate the moment of inertial for the Fig. Q10(b), shown below about Horizontal , Vertical Centroidal axis.	10	L3	CO5

Fig. Q10(b)

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BESCK204A / BESCKA204

USN ☐☐☐☐☐☐☐☐☐☐

Second Semester B.E./B.Tech. Degree Examination, Nov./Dec. 2023
Introduction to Civil Engineering

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

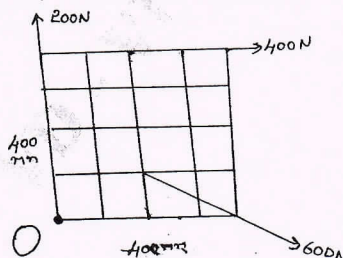|		Module – 1	M	L	C
Q.1	a.	List the different fields of civil engineering and explain the scope of following fields, i) Geotechnical Engineering　ii) Structural Engineering.	10	L1	CO1
	b.	Explain briefly with neat sketch : i) Foundation　ii) Chajja and Lintel iii) Column and beam　iv) Masonry wall　v) Staircase.	10	L1	CO1
		OR			
Q.2	a.	Explain briefly : i) Environmental and sanitary engineering ii) GIS and Erath quake engineering.	10	L1	CO1
	b.	Explain Bricks and Enumerate the requirement of good brick.	5	L1	CO1
	c.	Explain the difference between RCC and PSC.	5	L1	CO1
		Module – 2			
Q.3	a.	Explain Infrastructure and types of infrastructure.	6	L1	CO2
	b.	Explain smart city concept, clean city concept and safe city concept.	10	L1	CO2
	c.	Explain briefly Energy efficient buildings.	4	L1	CO2
		OR			
Q.4	a.	Write a short note on Demolition and Recycled waste.	6	L1	CO2
	b.	Explain briefly solid waste management and urban air pollution management.	6	L1	CO2
	c.	Explain sustainable construction of buildings and sustainable development goals.	8	L1	CO2
		Module – 3			
Q.5	a.	State and Prove Parallelogram law of forces.	8	L2	CO3
	b.	Determine that magnitude, direction, X and Y intercept of the resultant force system acting on the lamina with respect to 0 as shown in Fig Q5(b). All dimensions are in mm, each unit is 100mm.	12	L3	CO3

Fig Q5(b)

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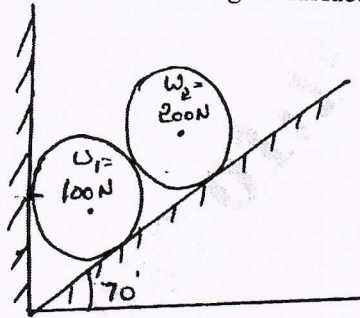| Q.6	a.	**OR** State and Prove Varigon's theorem.			
			8	L2	CO3
	b.	2 cylinder each of weight 100N and 200N on an inclined plane, which makes an angle of 70º with the vertical wall as shown in Fig Q6(b). Find the reaction at all contact points, assuming all surfaces to be smooth.	12	L3	CO3

Fig Q6(b)

Module – 4

Q.7	a.	Define : i) Centroid ii) Centre of gravity iii) Axis of symmetry.	6	L1	CO4
	b.	Locate the centroid of the shaded area shown in Fig Q7(b) with respect to OX and OY, all dimension in mm.	14	L3	CO4

Fig Q7(b)

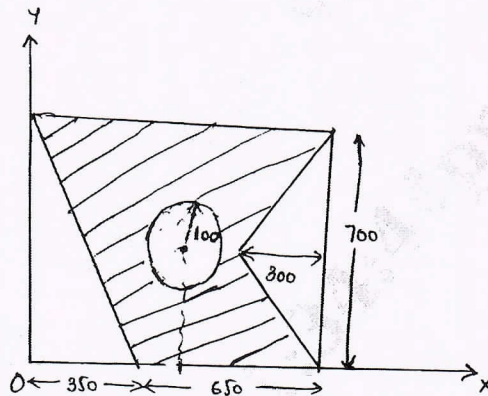**OR**

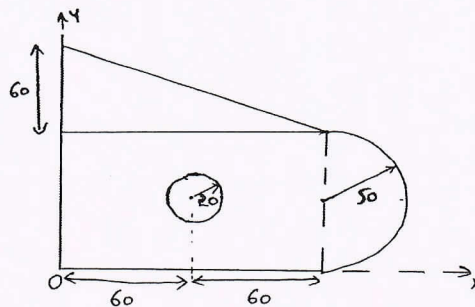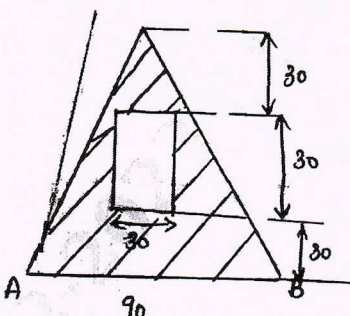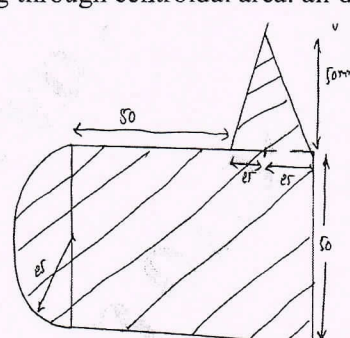| Q.8	a.	Derivation of expression for centroid of Equilateral triangle.	6	L2	CO4
	b.	Determine the centroid with respect to origin 0 for the section as shown in Fig Q8(b). All dimensions are in mm.	14	L3	CO4

Fig Q8(b)

2 of 3

		Module – 5			
Q.9	a.	State and prove Parallel axis theorem.	6	L2	CO5
	b.	Determine the MOI and radius of gyration of the area shaded shown in Fig Q9(b) about the base AB and cetnroidal axis parallel to AB, All dimensions are in mm.	14	L3	CO5

Fig Q9(b)

		OR			
Q.10	a.	Define : i) Radius of gyration ii) Product of inertia	6	L1	CO5
	b.	Determine the MOI for the shaded area shown in Fig Q10(b) below above horizontal axis passing through centroidal area. all dimensional are in mm	14	L3	CO5

Fig.Q10(b)

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal   **Page 40 of 48**

CBCS SCHEME

USN ☐☐☐☐☐·☐☐☐☐☐

18CIV14/24

First/Second Semester B.E. Degree Examination, July/August 2021
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Explain the role of civil engineers in the infrastructural development. **(06 Marks)**
   b. Define: parallelogram law of force, resolution and composition of force. **(06 Marks)**
   c. Find the magnitude and direction and position of resultant force for the system shown in Fig.Q.1(c). **(08 Marks)**
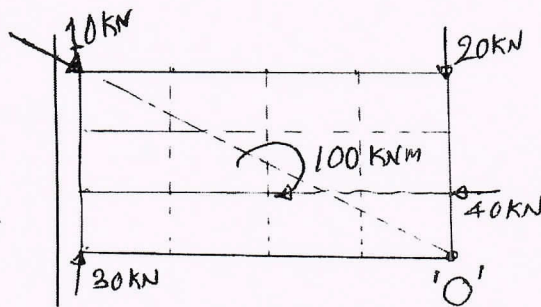

Fig.Q.1(c)

2 a. Explain different fields and scope of different field of Civil Engineering. **(06 Marks)**
   b. State and prove Varignon's principle of moments. **(06 Marks)**
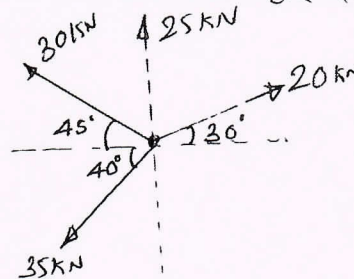   c. Find the resultant for the system of force shown in Fig.Q.2(c). **(08 Marks)**

Fig.Q.2(c)

3 a. Find the tension in the cable for the system shown in Fig.Q.3(a) take AB parallel to CD. **(08 Marks)**
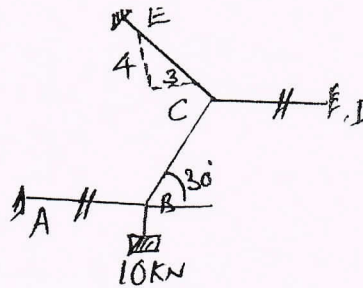

Fig.Q.3(a)

   b. Explain limiting friction and laws of friction. **(04 Marks)**

1 of 3

KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

c. The block A and B weighing 20kN and 15kN are connected by a wire passing over smooth frictionless pulley as shown in Fig.Q.3(c). Determine the magnitude of force p required to impend the motion. Take $\mu = 0.2$. **(08 Marks)**
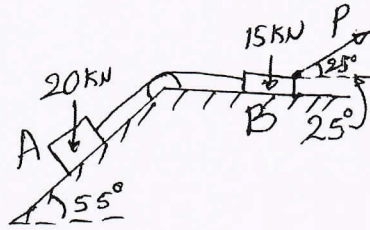

Fig.Q.3(c)

4 a. Find the reaction at the surface of contact for two identical cylinder as shown in Fig.Q.4(a) weight of cylinder 1000N. **(08 Marks)**
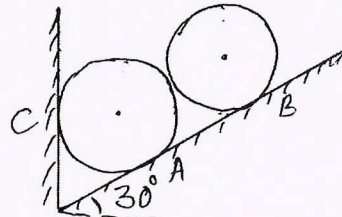

Fig.Q.4(a)

b. Define: i) Equilibrium ii) Lamis theorem. **(04 Marks)**

c. A body resting on horizontal require a pull of 180N inclined at 30° to the horizontal just to move it. It was found that push of 220N inclined at 30° to the horizontal to move the same. Determine the weight of body and coefficient of friction. **(08 Marks)**

5 a. Explain different types of loads and supports with the help of sketches. **(06 Marks)**
   b. What are the assumption made in the analysis of trusses? **(04 Marks)**
   c. Determine the reaction at support for the beam shown in Fig.Q.5(c). **(10 Marks)**
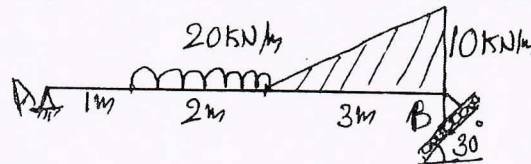

Fig.Q.5(c)

6 a. Explain the methods of analysis of trusses. **(04 Marks)**
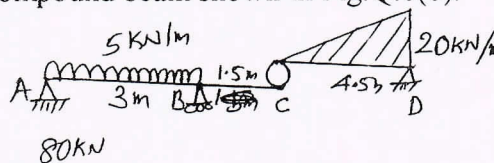   b. Find the reaction for the compound beam shown in Fig.Q.6(b). **(08 Marks)**

Fig.Q.6(b)

c. Analyze the truss shown in Fig.Q.6(c) and tabulate the forces in the members. **(08 Marks)**
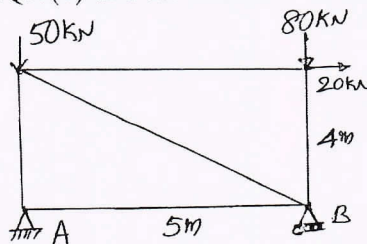

Fig.Q.6(c)

2 of 3

7 a. Define centroid. Distinguish between centroid and center of gravity. **(04 Marks)**
   b. Derive center of gravity for semicircle of radius 'r'. **(06 Marks)**
   c. Find I_{XX}, I_{YY} above CG axis for the area shown in Fig.Q.7(c). **(10 Marks)**
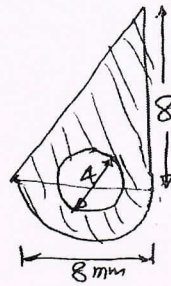

Fig.Q.7(c)

8 a. Define: i) Moment of Inertia   ii) Parallel axes theorems   iii) Perpendicular axis theorems
       iv) Radius of gyration. **(04 Marks)**
   b. Find the CG with respect to XY axis for the area shown in Fig.Q.8(b). **(08 Marks)**
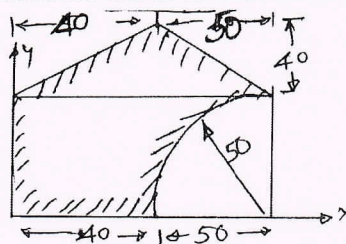

Fig.Q.8(b)

   c. Find I_{XX} and I_{YY} for the area shown in Fig.Q.8(c). **(08 Marks)**
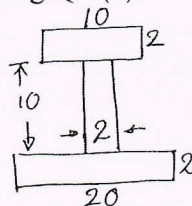

Fig.Q.8(c)

9 a. Derive the equation for the path of a projectile. Obtain the expression for max height, time
       of flight and max range. **(08 Marks)**
   b. An aeroplane is flying horizontally at a height 8000m. A bomb is released from aeroplane
       having speed 600kmph. Determine the time required for the bomb to reach ground and
       horizontal distance travelled by the bomb. **(06 Marks)**
   c. A tower 90 height A particle is dropped from top of the tower at the same time another
       particle is projected upwards from foot of the tower both meet at 3am from bottom. Find the
       velocity of projection of second particle. **(06 Marks)**

10 a. Explain Newtons laws of motion. **(04 Marks)**
    b. Explain: i) Super elevation   ii) Rectilinear and curvilinear motion   iii) Projectile motion. **(06 Marks)**
    c. A projectile is fired from the edge of a 150m high cliff with an initial velocity 180m/sec at
        an angle of elevation of 30° with horizontal. Find:
        i)   Horizontal distance between gun and point where the bullet strikes the ground.
        ii) Greatest height above the ground reached by projectile.
        iii) Actual velocity with which bullet strikes the ground. **(10 Marks)**

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

USN ☐☐☐☐☐☐☐☐☐☐

First/Second Semester B.E. Degree Examination, July/August 2021
Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Explain briefly the scope of any three fields of civil engineering.   (06 Marks)
   b. Explain the principles in engineering mechanics.   (06 Marks)
   c. Fig. Q1 (c) shows a Cantilever beam with two forces and a couple:
       (i)   Determine the resultant of the system.
       (ii) Determine the equivalent system through A.   (08 Marks)
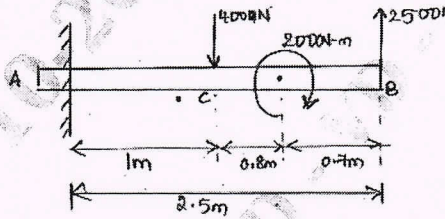

Fig. Q1 (c)

2 a. Draw typical cross section of a road and explain its components.   (06 Marks)
   b. With neat sketches, explain the classification of force system.   (06 Marks)
   c. A horizontal force of 1000 N is acting on the lever AB. Find the equivalent system at the
       support B. Refer Fig. Q2 (c).   (08 Marks)
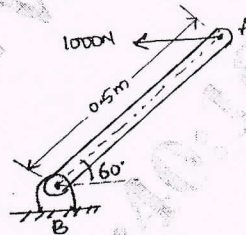

Fig. Q2 (c)

3 a. State and explain parallelogram law of forces.   (06 Marks)
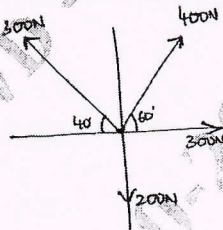   b. Find the resultant of the coplanar concurrent force system shown in Fig. Q3 (b). (06 Marks)

Fig. Q3 (b)
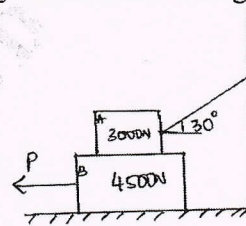

Fig. Q3 (c)

   c. A block weighing 4500 N resting on horizontal surface supports another block of 3000 N as
       shown in Fig. Q3 (c). Find the horizontal force 'P' required to just move the block to the
       left. Take μ for all contact surface as 0.3.   (08 Marks)

4 a. Define Friction. Explain the types of friction.   (05 Marks)
   b. Find the value of W, which is required to maintain equilibrium configuration as shown in
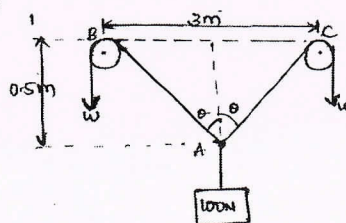   Fig. Q4 (b)   (07 Marks)

Fig. Q4 (b)

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KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

c. Two identical rollers, each weighing 4000 N, are placed in a trench as shown in Fig. Q4 (c). Assuming that all contact surfaces are smooth, determine the reactions at contact points A, B, C and D. **(08 Marks)**
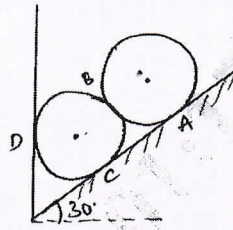

Fig. Q4 (c)

5 a. State and prove Varignon's principle of moments. **(08 Marks)**
   b. Find the magnitude, direction and position of the resultant force with respect to point 'A' as shown in Fig. Q5 (b). **(06 Marks)**
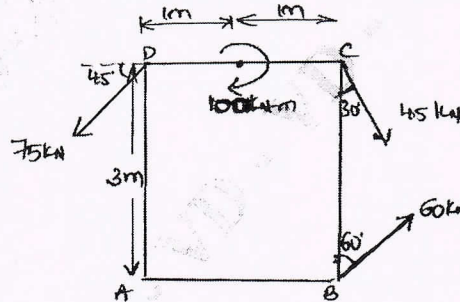

Fig. Q5 (b)

   c. Find the support reactions of the beam loaded as shown in Fig. Q5 (c). **(06 Marks)**
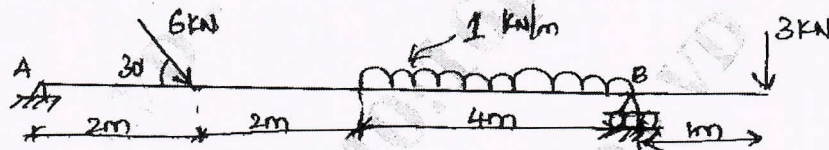

Fig. Q5 (c)

6 a. Explain with neat sketches, different types of supports. **(04 Marks)**
   b. Determine the reactions at A and E for the beam loaded as shown in Fig. Q6 (b). **(08 Marks)**
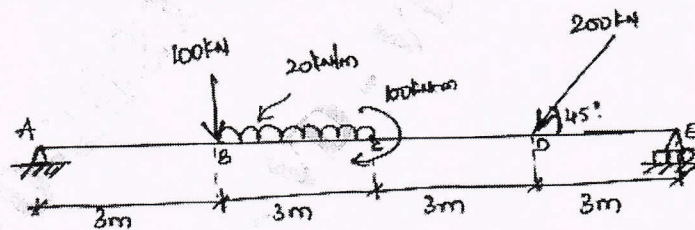

Fig. Q6 (b)

   c. Determine the resultant and equillibriant of the forces acting as shown in Fig. Q6 (c) with respect to Point A. **(08 Marks)**
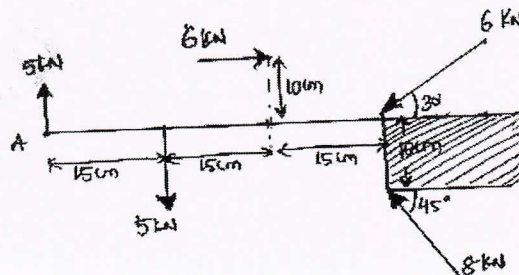

Fig. Q6 (c)
2 of 3

7   a. Locate the centroid of triangle from the first principles.   **(10 Marks)**
     b. Determine the moment of inertia and radius of gyration of the area shown in Fig.Q7 (b) about the base AB and centroidal axis parallel to AB.   **(10 Marks)**
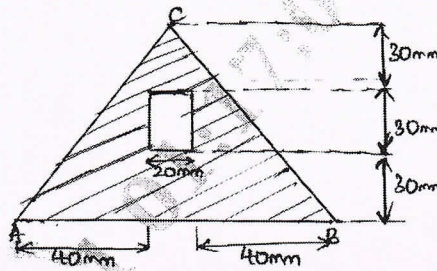
Fig. Q7 (b)

8   a. State and prove parallel axes theorem.   **(08 Marks)**
     b. Locate the centroid of the shaded area as shown in Fig. Q8 (b).   **(12 Marks)**
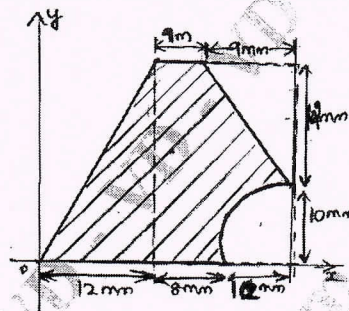
Fig. Q8 (b)

9   a. Define the following terms : (i) Rectilinear motion.   (ii) Curvilinear motion
        (iii) Projectile motion   **(06 Marks)**
     b. Explain with neat sketch, the following :
        (i) Angle of projection   (ii) Time of flight   (iii) Horizontal range.   **(06 Marks)**
     c. A ball is thrown vertically into the air at 36 m/s. After 3 seconds another ball is thrown vertically up. With what initial velocity must the second ball have to pass the first at 30 m from the ground?   **(08 Marks)**

10   a. Define super elevation. Why is it necessary to provide super elevation?   **(04 Marks)**
     b. Derive an expression for path of projectile.   **(06 Marks)**
     c. A projectile is fired from the top of cliff 150 m height with an initial velocity of 180 m/s at an angle of elevation of 30° with the horizontal. Neglecting air resistance, determine (i) The greatest elevation above the cliff (ii) The great elevation above the ground reached by the projectile. (iii) The horizontal distance from the gun to the point where the projectile strikes the ground. Refer Fig. Q10 (c).   **(10 Marks)**
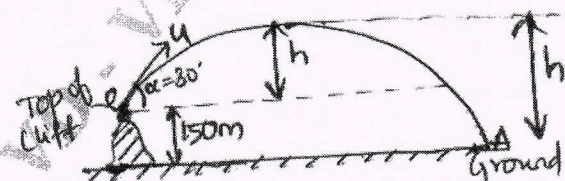
Fig. Q10 (c)

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CBCS SCHEME

USN ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜　　　　　BCHEC102

First Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023
Applied Chemistry for Civil Engineering Stream

Time: 3 hrs.　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the properties and application of Aluminum and its alloys.	7	L2	CO1
	b.	Explain the process of setting and hardening of cement.	7	L2	CO1
	c.	What are Refractories? Explain the classification of Refractories based on chemical composition.	6	L2	CO1
		OR			
Q.2	a.	Explain the preparation of soda-lime glass.	7	L2	CO1
	b.	Explain the testing of cement by EDTA method.	7	L2	CO1
	c.	Write a note on metal and its alloys by taking Iron as an example.	6	L2	CO1
		Module – 2			
Q.3	a.	Describe the construction and working of photovoltaic cell.	7	L2	CO2
	b.	What are Batteries? Explain construction and working of Li-ion battery.	7	L2	CO2
	c.	Explain Electrochemical corrosion of steel in concrete.	6	L2	CO2
		OR			
Q.4	a.	Explain construction and working of Methanol-oxygen Fuel cell.	7	L2	CO2
	b.	Discuss following types of corrosion: i)　　Stress corrosion. ii)　　Differential metallic corrosion.	7	L2	CO2
	c.	Describe the following corrosion control methods: i)　　Anodizing of Aluminum ii)　　Sacrificial anode method.	6	L2	CO2
		Module – 3			
Q.5	a.	Describe the estimation of total hardness by using EDTA solution.	7	L2	CO3
	b.	Define Nano materials. Explain the synthesis of Nano materials by sol-gel method.	7	L2	CO3
	c.	Mention the properties and applications of graphene.	6	L2	CO3

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OR

Q.6	a.	25cm^3 of effluent requires 8.3cm^3 of 0.01M acidified $K_2Cr_2O_7$ for complete oxidation. Calculate the COD of effluent sample.	7	L2	CO3
	b.	Explain the size-dependent properties of Nano materials with example i) Surface area ii) Catalytic property.	7	L2	CO3
	c.	Explain the process of water softening by Ion-exchange method.	6	L2	CO3

		Module – 4			
Q.7	a.	Explain the synthesis, properties and applications of Chloro Poly Vinyl Chloride (CPVC).	7	L2	CO4
	b.	Describe synthesis, properties and applications of Nylon fibers.	7	L2	CO4
	c.	Define biodegradable polymers. Explain synthesis and applications of poly lactic acid.	6	L2	CO4

		OR			
Q.8	a.	A polymer sample contains 100, 200, 300 and 400 molecules having molecular mass 1000, 2000, 3000 and 4000 gm/mol respectively. Calculate the Numer average and weight average molecular masses of the polymer.	7	L2	CO4
	b.	What are polymer composites? Explain properties and applications of fiber reinforced polymer composites.	7	L2	CO4
	c.	Describe synthesis and properties of Epoxy resins.	6	L2	CO4

		Module – 5			
Q.9	a.	Define the following terms with examples: i) Phase ii) Component iii) Degree of freedom.	6	L2	CO5
	b.	Describe the applications of conductometric sensors in estimation of acid mixture.	7	L2	CO5
	c.	Explain the determination of pH of soil sample using pH sensors.	7	L2	CO5

		OR			
Q.10	a.	With the help of neat phase diagram describe the Lead-Silver (pb-Ag) system.	7	L2	CO5
	b.	Write a note on phase rule and phase diagram.	6	L2	CO5
	c.	Explain the estimation of Iron using potentiometric sensors.	7	L2	CO5

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