Marks	Grade Point	Letter Grade	Marks	Grade Point	Letter Grade
80>	4.00	A+	55-59	2.75	B-
75-79	3.75	A	50-54	2.50	C+
70-74	3.50	A-	45-49	2.25	C
65-69	3.25	B+	40-44	2.00	D
60-64	3.00	B	0-39	0.00	F

Subject Teacher	**: Md. Emon Khan**
Subject Name	: Structural Mechanics
Subject Code	: **26431**
Technology	: Civil
Semester	: **3rd Civil & 5th Arch**
Reference Book	: Structural Mechanics (Publisher: Technical or Haque

Prokashan

Mark Distribution (for 150 Marks)			
Theory Marks		Practical Marks	
Midterm	20	PC	25
Class test	05	PF	25
Quiz test	05	-	-
Final	120	-	-
Total	150	Total	50

INTENTION

Class Time Distribution (90 Minutes)	
Follow up absent students	5
Previous class review	10
Present class topic discussion	60
Present class topic review	10
Next class topic	5
Total	90

AIMS

- <u>To enable to apply the knowledge of scientific principles to problems of a mechanical nature.</u>
- <u>To develop an understanding of mechanical properties of materials.</u>
- <u>To assist in applying mathematical and geometrical calculations to the analysis of statically determinate beams.</u>

SHORT DESCRIPTION

How to find out the CG, Resultant of force, lamas theorem, Centre of gravity, moment of inertia, find the force of truss, how to draw shear force and bending moment diagram.

Lecture	Chapter	Supporting Equipment	Topic	Benefits
01	**Understand Fundamental of Mechanics.**	https://www.youtube.com/watch?v=BHZALtqAjeM	1.1. Define mechanics. 1.2. Classify applied mechanics. 1.3. Importance of units in the engineering field.	1. To know about the mechanics, Classify applied mechanics.
02	**Understand Fundamental of Mechanics.**	https://www.youtube.com/watch?v=BHZALtqAjeM	1.4. Discuss the conversion of units. 1.5. Illustrate the fundamental mathematics (algebra, trigonometry & calculus) used in mechanics.	1. To know conversion of units.
03	**Understand the composition and resolution of forces.**	https://www.youtube.com/watch?v=BHZALtqAjeM	2.1. State the effect and characteristics of a force. 2.2. Mention different system of forces. 2.3. Define resultant force and composition of forces. 2.4. Find the resultant force graphically and analytically.	1. To know the effect and characteristics of a force, resultant force graphically and analytically.
04	**Class Test**	**Theory Base**	**Chapter-1**	Students are able to Solve problems involving resilience, thermal stress and poisons ratio.
05	**Understand the composition and resolution of forces.**	https://www.youtube.com/watch?v=4Bwwq1munB0	2.5. State the laws of forces. 2.6. Define resolution of a force. 2.7. State the principle of resolution of force.	1. To know about the law of force.
06	**Understand the composition and resolution of forces.**	https://www.youtube.com/watch?v=4Bwwq1munB0	2.8. Express the deduction of the formula for finding the resolved part of a component. 2.9. Find the magnitude and position of the resultant force graphically and analytically 2.10. Solve problems related to resultant force.	1.To known the composition of forces and resolution of force

07	**Understand the aspects of moment of forces and couples.**	https://www.youtube.com/watch?v=4Bwwq1munB0	3.1. Define moment of force and mention the units of moment. 3.2. Identify the clockwise and anticlockwise moment. 3.3. State the Varignon's principle of moments.	1. To know about moment of force and mention the units of moment.
08	**Quiz Test**	**Theory Base**	**Chapter 2**	Students are able to slove co-planar forces, Explain and solve Lama's theorem problems.
09	**Understand the aspects of moment of forces and couples.**	https://www.youtube.com/watch?v=ESusD8HRLBI	3.4. State the laws of moments. 3.5. Define and classify the lever. 3.6. State and classify parallel force.	1. To know about laws of moments and classify parallel force.
10	**Understand the aspects of moment of forces and couples.**	https://www.youtube.com/watch?v=ESusD8HRLBI	3.7. Define and classify a couple. 3.8. Solve problems related to moment of forces and couple.	1. To know classify a couple and Solve problems related to moment of forces and Couple.
11	**Class Test**	**Theory Base**	**Chapter-3**	Students are able to Solve problems on moment of couple and moment of forces.
12	**Understand the aspects of equilibrium of forces.**	https://www.youtube.com/watch?v=ZA_D4O6l1lo	4.1. State the principles of equilibrium of forces. 4.2. State the Lama's theorem.	1. To know Principles of equilibrium of forces.
13	**Understand the aspects of equilibrium of forces.**	https://www.youtube.com/watch?v=ZA_D4O6l1lo	4.3. Express the derivation of Lame's theorem. 4.4. Describe different methods of the equilibrium of coplanar forces and non-coplanar forces.	1. To know about the derivation of Lame's theorem.
14	**Understand the aspects of equilibrium of forces.**	https://www.youtube.com/watch?v=ZA_D4O6l1lo	4.5. Explain the conditions of equilibrium. 4.6. Mention the various types of equilibrium of forces.	1. To know about State friction, static friction and dynamic friction.
15	**Understand the aspects of equilibrium of forces.**	https://www.youtube.com/watch?v=ZA_D4O6l1lo	4.7. Solve problems related to equilibrium of forces.	1. Solve problems related to equilibrium of forces.
16	**Understand the concept of centroid and**	**https://www.youtube.com/watch?v=o3raQVXb4jM**	5.1. Define center of gravity and centroid. 5.2. Distinguish between center of gravity and centroid.	1. To know about the center of gravity and centroid and distinguish

				between center of gravity and centroid.
17	**Understand the concept of centroid and center of gravity.**	**https://www.youtube.com/watch?v=o3raQVXb4jM**	5.3. Explain the methods of finding out centroid of simple geometrical figure. 5.4. Identify the axis of reference and axis of symmetry. 5.5. Determine the centroid of rectangle, triangle, semicircle, geometrically and by integration.	1. To know about the methods of finding out centroid of simple geometrical figure and centroid of rectangle, triangle, semicircle, geometrically and by integration.
18	**Understand the concept of centroid and center of gravity.**	**https://www.youtube.com/watch?v=o3raQVXb4jM**	5.6. Determine the centroid of plain geometrical figure by principle of first moments. 5.7. Calculate the centroid of various composite areas. 5.8. Calculate the center of gravity of solid bodies.	1. To know about the centroid of plain geometrical figure by principle of first moments and center of gravity of solid bodies.
19	**Quiz Test**	Theory Base	**Chapter: 4, 5.**	Students are able to write about State friction, static friction and dynamic friction.
20	**Review Class**	**Before Mid Exam Syllabus**	**Chapter:1-2 (**Regarding students problem)	Problem solve for midterm exam
21	**Presentation**	**Laptop, projector**	**Short presentation by individual student.**	Be confident on practical life.
Midterm Exam				
22	**Understand the application of moment of inertia.**	**https://www.youtube.com/watch?v=o3raQVXb4jM**	6.1. Explain the term moment of inertia and the units of moment of inertia. 6.2. Express the derivation of the formulae for moment of inertia of an area.	1. To know about the term moment of inertia and the units of moment of inertia.
23	**Understand the application of moment of inertia.**	**https://www.youtube.com/watch?v=o3raQVXb4jM**	6.3. Describe the methods for finding out the moment of inertia. 6.4. Find the moment of inertia of simple areas by the method of integration. 6.5. State and proof of the theorem of perpendicular axis as applied to moment of inertia.	1. To know about the methods for finding out the moment of inertia and proof of the theorem of perpendicular axis as applied to moment of inertia
24	**Quiz Test**	**Theory Base**	**Chapter:6**	Students are able to State the axis of symmetry.

25	**Understand the application of moment of inertia.**	https://www.youtube.com/watch?v=o3raQVXb4jM	6.6. State the parallel axis theorem in the determination of moment of inertia of areas. 6.7. Explain the radius of gyration and section modulus. 6.8. Calculate the moment of inertia and section modulus of composite sections and simple solid bodies.	1. To know about the parallel axis theorem in the determination of moment of inertia of areas. Solve the problem of moment of inertia.
26	**Understand the principles and application of friction**	https://www.youtube.com/watch?v=o3raQVXb4jM	7.1. Define friction. 7.2. Identify the types of friction. 7.3. Advantage and disadvantage of friction.	1. To know about friction. 2. To know the types of friction.
27	**Class Test**	Theory Base	**Chapter:6**	Students are able to State the axis of symmetry
28	**Understand the principles and application of friction**	https://www.youtube.com/watch?v=o3raQVXb4jM	7.4. State the laws of static and dynamic friction. 7.5. Explain the angle of friction. 7.6. Explain coefficient of friction.	1. To know about the laws of static and dynamic friction. 2. Explain coefficient of friction
29	**Understand the principles and application of friction hollow circular shaft.**	https://www.youtube.com/watch?v=o3raQVXb4jM	7.7. Explain free body diagrams of a body lying on horizontal, inclined and vertical surfaces. 7.8. Determine the frictional force of a body lying on horizontal and inclined surfaces.	1. To know about the free body diagrams of a body lying on horizontal, inclined and vertical surfaces. 2. Solve the problem of friction related math.
30	**Class Test**	Theory Base	**Chapter:7**	Students are able to known the relations among torsion, horse power and velocity of shaft
31	**Understand the fundamentals of support reaction on beams and Truss**	https://www.youtube.com/watch?v=o3raQVXb4jM	8.1. Explain support reactions. 8.2. Identify types of beam. 8.3. Explain the types of loading on beams.	1. To know about reactions. 2. Know the types of loading on beams.
32	**Understand the fundamentals of support reaction on beams and Truss**	https://www.youtube.com/watch?v=o3raQVXb4jM	8.4. Determine the support reactions of simple and cantilever beam with different loading condition. 8.5. Define the support reactions of roller supported beam.	1. To know about support reactions of simple and cantilever beam with different loading condition. 2. Know about the frame.

			8.6. Define frame.	
33	**Understand the fundamentals of support reaction on beams and Truss**	**https://www.youtube.com/watch?v=o3raQVXb4jM**	8.7. Identify the frames and trusses with their end supports. 8.8. State the method of finding support reactions and forces on the member of the frame. 8.9. Calculate the support reactions and forces on different end support of simple truss by joint method and Section method.	1. To know about the free body diagrams of a body lying on horizontal, inclined and vertical surfaces. 2. Solve the problem of reaction related math.
34	**Understand the aspects of work, power and energy.**	**https://www.youtube.com/watch?v=TPWZN9YpUWY**	9.1. Define work, power and energy. 9.2. State the units of work, power and energy. 9.3. Explain the work done in rotation. 9.4. Mention the types of engine power. 9.5. Define and classify engine efficiency.	1. To know about work, power and energy. 2. Know about the engine efficiency.
35	**Understand the aspects of work, power and energy.**	**https://www.youtube.com/watch?v=TPWZN9YpUWY**	9.6. Mention types of energy. 9.7. Explain the derivation of the equation of kinetic & potential energy.	1. To know types of energy. 2. Know about the kinetic & potential energy.
36	**Understand the aspect of stress and strain.**	**https://www.youtube.com/watch?v=u0HuZYsvzJU**	10.1 Define stress, strain, and modulus of elasticity, Poison's ratio and principle of shear stress. 10.1. Explain the stress in composite bar, stress in nuts and bolts, and stress due to change in temperature. 10.2. Describe the linear and lateral strain.	1. To know stress, strain, and modulus of elasticity, Poison's ratio and principle of shear stress 2. Know about the linear and lateral strain.
37	**Understand the aspect of stress and strain.**	**https://www.youtube.com/watch?v=u0HuZYsvzJU**	10.3. Explain the stress strain diagram. 10.4. Solve problems on stress and strain.	1. To know stress, strain, and modulus of elasticity, Poison's ratio and principle of shear stress 2. Solve problems on stress and strain
38	**Review Class**	**All Books**	**Chapter:1-10** (Regarding students problem)	Problem solve for final exam.
	Final Examination			