

CLASS: T. E (Mechanical / Automobile)		Semester - V	
DYNAMICS OF MACHINERY - 1			
Periods per week 1 Period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	-	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	25

1. CLUTCHES:

- 1.1 Clutches. Positive clutches friction clutches
- 1.2 Friction Clutches - Analysis of frictional torque, power transmission. Power loss in
- 1.3 Friction in single plate, multiple plate clutch, and cone clutch
- 1.4 Centrifugal Clutches - construction, working

2. GOVERNORS:

- 2.1 Comparison between governors and flywheel
- 2.2 Types - centrifugal governors, inertia governors
- 2.3 Force analysis of gravity loaded governors - Watt, Porter, Proell
- 2.4 Force analysis of spring loaded governors - Hartnell, hartung, Wilson Hartnell
- 2.5 Force analysis of spring and gravity loaded governor
- 2.6 Performance characteristics of governors - stability, sensibility, isochronisms, Hunting, governor effort and governor power, coefficient of insensitiveness.

3. GYROSCOPE:

- 4.1 Introduction - Gyroscopic couple and its effect on spinning bodies
- 4.2 Gyroscopic effect on naval ships during steering, pitching and rolling.
- 4.3 Ship stabilization with gyroscopic effect
- 4.4 Two wheeler and four wheeler on curved path - effect of gyroscopic and centrifugal couples, maximum permissible speeds on curve paths.
- 4.5 Gyroscopic effect due to lateral misalignment of rigid disc mounted on shaft.

4. BRAKES AND DYNAMOMETERS:

- 4.1 Types of Brakes, Analysis of Block brakes - external and internal, Band brake simple and differential, Band and block brake - simple and differential
- 4.2 Braking of vehicles - front wheels, rear wheels, all wheels on level and inclined

roads.

- 4.3 Types of dynamometers - Absorption and transmission dynamometers
- 4.4 Study and analysis of absorption type dynamometer - Prony brake, Rope brake dynamometers.
- 4.5 Study and analysis of transmission type dynamometers - Belt transmission, epicyclic, torsion dynamometers,
- 4.6 Froude hydraulic dynamometer

5. GEAR TRAINS:

- 6.1 Kinematics and dynamic analysis of - simple gear trains, compound gear trains, reverted gear trains, epicyclic gear trains with spur or bevel gear combination

6. FLYWHEEL:

- 6.1 Static and dynamic force analysis in slider crank mechanism neglecting mass of connecting rod and crank.
- 6.2 Turning moment diagram, fluctuation in energy, function of flywheel estimating inertia of flywheel for reciprocating prime movers and machines.
- 6.3 Static force analysis in gears - spur, bevel, helical, Worm and worm gear
- 6.4 Static and dynamic force analysis - in linkage mechanism (up-to 4 links) by virtual work method
- 6.5 Dynamic equivalent system to convert rigid body to two mass systems with and without correction couple.

7. BELT AND ROPE DRIVE:

- 7.1 Types - flat, V, rope belt
- 7.2 Kinematic Analysis - velocity ratio, slip and creep of belt length of belt for open and crossed belting dynamic analysis - driving tensions, centrifugal tension, initial tension.
- 7.3 Power transmission, max power transmission condition.

TERM WORK:

Term work shall comprise of the class assignments, laboratory experiments and a class test based on above syllabus.

Class assignments and laboratory experiments : 15 Marks

Class test

: 10 Marks

Total : 25 Marks

LABORATORY EXPERIMENTS: (At least 5 experiments from the list)

1. Experiments on mass moment of inertia of rigid body
2. Experiments on Gyroscope
3. Experiments on Governors - Proell Governor, Hartnell Governor)
4. Experiments on Dynamometers - Rope Brake DynmTIO111eter, Torsion Dynmnometer
5. Study of power transmission system in automobile

ASSIGNMENTS: Minimum three problems on each topic of the syllabus.

TEXT BOOKS:

1. Theory of Machines - Thomas Bevan - C. B. S. Publishers
2. Theory of Machines - S. S. Ratan - Tata McGraw Hill
3. Theory of Machines - P. L. Ballaney, Khanna Publishers, Delhi
4. Mechanics of Machines - Elementary Theory and Examples - by J. Hannah and R. C. Stephens - Arnold international Students Edition.
5. Mechanics of Machines) Advanced Theory and Examples - J. Hannah and R. C. Stephens
- Arnold international Students Edition.

REFERENCES:

- Dynamics of 1vlachines - Norton
- Theory of Mechanisn1s and Machines - A. Ghosh and A. Malik - Affiliated East - West Press Pvt. Ltd., New Delhi
- Theory of Machines - W. G. Green - Bluckie & Sons Ltd.
- Theory of Machines - R. S. Khurmi - 1. K. Gupta
- Theory of Machines - R. K. Bansal
- Mechanics & Dynamics of Machinery - J. Srinivas, Scitech