Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI COLLEGE OF ENGINEERING
(Recognised by A.I.C.T.E., New Delhi & Govt. of Maharashtra, Affiliated to R.T.M.Nagpur University)
Near CRPF Campus, Hingna Road, Nagpur-440 019, Maharashtra (India)
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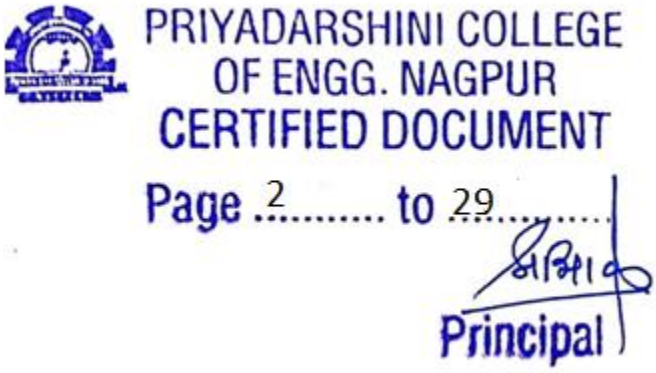
1.3.2 Average percentage of courses that include experiential learning through project work/field work/internship during last five years

2019-20



1.3.2 Average percentage of courses that include experiential learning through project work/field work/internship during last five years

B.E – MECHANICAL ENGINEERING M-TECH-MECHANICAL ENGINEERING DESIGN

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Cod	Domain	Page No
1	Kinematics Of Machines	BEME302T	**Design**	**8,** **16,** **21**
2	Machine Drawing	BEME306P		
3	Design of Machine Elements	BEME502T		
4	Computer Aided Design	BEME703T/P		
5	Design of Mechanical Drives	BEME705T/P		
6	Mechanics Of Material	BEME405T/P		
7	Dynamics of Machines	BEME605T/P		
8	Elective – I: Tool Design	BEME702T2		
9	Elective – I: Advance I.C. Engines	BEME803T5		
10	Dynamics of Machinery	PGMED102T		
11	Advanced Mechanical Drives	PGMED201T		
12	Design of Mechanical Handling System	PGMED203T		
13	Elective III-Tribology And Bearing Design	PGMED204T		
14	Finite Element Analysis	PGMED207P		
15	Elective IV-Finite Element Analysis	PGMED301T		

16	Elective IV-Optimization in Engg. Design	PGMED301T		
17	Stress Analysis	PGMED202T/P		
18	Mechanical Vibrations	PGMED103T/P		
19	Advanced Mechanisms	PGMED101T/P		
20	Manufacturing Process	BEME304T/P	**Production**	**12**
21	Machining Processes	BEME404T/P		
22	Advanced Production Processes	BEME503T		
23	Automation in Production	BEME804T/P		
24	Industrial Engineering	BEME701T		
25	Industrial Economics & Entrepreneurship Development	BEME501T		
26	Industrial Management	BEME801T		
27	Engineering Metallurgy	BEME305T/P		
28	Mechanical Measurement & Metrology	BEME505T/P		
29	Operations Research	BEME603T		
30	Elective – I: Industrial Robotics	BEME702T1		
31	Engineering Thermodynamics	BEME402T	**Thermodynamics**	**25**
32	Fluid Mechanics	BEME303T		
33	Hydraulics Machines	BEME403T/P		
34	Heat Transfer	BEME504T/P		

35	Energy Conversion- I	BEME601T		
36	Energy Conversion - II	BEME704T/P		
37	Energy Conversion - III	BEME805T/P		
38	Elective – II: Industrial Fluid Power	BEME802T3/P3		
39	Elective – III: Renewable Energy Systems	BEME803T3		
40	Elective III-Design of Hydraulic And Pneumatic System	PGMED204T		
41	Industrial Visit	BEME507P	**Other**	**4**
42	Industrial Case Study	BEME608P		
43	Mini Project	BEME407P		
44	Project Seminar	BEME706		
45	Project Seminar	PGMED303P		
46	Project	BEME806P		
47	Project	PGMED401P		
48	Control Systems Engineering	BEME602T		
49	Computer Applications – I	BEME506T		
50	Mechatronics	BEME604T/P		
51	Functional English	BEME606T		
52	Computer Applications – II	BEME607P		
53	Technical Report and Seminar	BEME307P		
54	Environmental Studies	BEME406T		

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering and Technology
B.E. (MECHANICAL ENGINEERING): SIXTH SEMESTER

BEME602T: CONTROL SYSTEMS ENGINEERING (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is formulated to familiarize the students with concepts related to the operation, analysis and stabilization of control systems. The main objective of this course is to make understanding of various control systems and its stability analysis using analytical and graphical techniques, to understand the concepts of Time Domain and Frequency Domain analysis of control system, Mathematical modeling and Transfer function of engineering systems. At the end of this course, student will be able to understand various control systems & their stability analysis.

UNIT – I **[8 Hrs.]**

Control System controls: Study of Control System components such as hydraulic actuators, Servomechanism D.C. and A.C. motor, liquid level control, Automobile Power Steering Control, Speed Control, Position control of Robotic Manipulator etc. Study and Analysis of performance characteristics, the concept of various types of system like machine tools, Prime movers, system generators, etc.

Modeling of Mechanical System: Basic Elements of Control System – Open loop and Closed loop systems – Differential equation – Laplace Transform –Transfer function, Modeling of physical system like Translational, rotational mechanical systems, Electric systems, Electronic system and Electro-mechanical system. Concept of transfer function & its determination for physical systems.

UNIT – II **[8 Hrs.]**

Transfer Function system Representation through Block Diagram and Signal Flow Graph: Block Diagram representation, Reduction Techniques for single and multiple input/output, Conversion of Block Diagram into Signal Flow Graph, Conversion of algebraic equation into Block Diagram and Signal Flow Graph. Transfer function through Block Diagram Simplification using Masons Gain Formula.

UNIT – III **[8 Hrs.]**

System Response & Time Domain Response Analysis: First and second order systems response to impulse, ramp and sinusoidal inputs, properties of unit step response of second order system, systems with velocity lag, Steady state errors and Error constants.

Signals: Step, Ramp, Impulse, Parabolic and Periodic signals with their mathematical representation and characteristics.

Mode of Controls: Basic control actions and Industrial controllers, Introduction to P, PI and PID controllers their characteristics, representation and applications. Classification of industrial automatic controllers, control actions, proportional controllers, obtaining derivative and integral control action, effects of integral and derivative control action on system performance.

Controller Mechanisms: Pneumatic, hydraulic and electric controllers, general principles for generating various control actions.

UNIT – IV [8 Hrs.]

Control system analysis: Concept and types of stability, Routh-Hurwitz Criterion and its application for determination of stability, limitations.

Root locus plot: Simple transfer functions transient response from root locus. Concept of stability, necessary condition for stability, Root locus concept, construction of Root loci.

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UNIT – V [8 Hrs.]

Frequency Domain analysis - Correlation between time and frequency responses of a second order System.

Bode & Polar plot: Determination of Gain Margin, Phase Margin and their Stability from Bode and Polar plots. Inverse Bode Plot, Transportation lag, System Identification from Bode plot.

UNIT – VI [8 Hrs.]

State space representation of Continuous Time systems: State equations, Transfer function from State Variable Representation – Solutions of the state equations, Concepts of Controllability and Observability, State space representation for Discrete time systems.

Stability criterion: Introduction to control system design lag lead compensation, Feed Back Compensation and Pole -Zero placement.

LIST OF TUTORIALS:

1) Mathematical Modeling of Mechanical and Electrical System.
2) Numerical examples of Block Diagram Reduction Technique and Signal Flow Graph.
3) Numerical of Time response analysis.
4) Numerical of Frequency Domain analysis.
5) Numerical of Routh's Criteria.
6) Numerical of Polar Plot.
7) Numerical of Root Locus.
8) Numerical of Bode plot.
9) Numerical of State space representations.
10) Numerical of Root Locus using MATLAB.

At least six exercises are expected.

TEXT BOOKS:

1. Control System Engineering, J. Nagrath and M.Gopal, New Age International Publishers, 5th Edition, 2007
2. Control System – Principles and Design, M. Gopal, Tata McGraw Hill, 2nd Edition, 2002.
3. Control Systems Engineering, S. K. Bhattacharya, Pearson.
4. Control System Engineering, Baxi and Goyal, Technical Publication, Pune.
5. Control Systems, Dhanesh N. Manik, Cengage Learning.
6. Control Systems -Theory & Application, Smarajit Ghosh, Pearson.
7. Control Systems, Anand Kumar, PHI.

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR (M.S.)

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate

It is to certify that this is a bonafide record of Project Work entitled

"FABRICATION AND DEVELOPMENT OF AUTOMATIC SLIDING GATE FOR RAILWAY CROSSING"

Carried out by

1. ADITYA PATTIWAR	2. AMIT NAGPUREY
3. ASHUTOSH MESHRAM	4. AKASH RAGHATATE
5. AKASH BALPANDE	6. PRAJWAL BELE

of 8th Semester

B.E. MECHANICAL ENGINEERING

during the academic year of 2019-20 in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING

offered by

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR (M.S.)

Prof. R.S. Tupkar	Prof. S. P. LOKHANDE
(PROJECT GUIDE)	(PROJECT COORDINATOR)
Dr. K. S. ZAKIUDDIN	Dr. M. P. SINGH
(HEAD OF THE DEPT.)	(PRINCIPAL)

ABSTRACT

The objective of this project is to provide an automatic railway gate at a level crossing replacing the gates operated by the gatekeeper. The system reduces the time for which the gate remains closed. This type of gates can be employed in an unmanned level crossing where the chances of accidents are higher and reliable operation is required. Since, the operation is automatic, error due to manual operation is prevented. The system works on a microcontroller based control. The proposed system uses ATmega 16A microcontroller. With the help of IR sensors .The arrival and leaving of the system is monitored and the gate is operated accordingly. The objective of this paper is to provide an automatic railway gate at a level crossing replacing the gates operated by the gatekeeper. It deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed, and secondly, to provide safety to the road users by reducing the accidents. By the presently existing system once the train leaves the station, the stationmaster informs the gatekeeper about the arrival of the train through the telephone. Once the gatekeeper receives the information, the closes the gate depending on the timing at which the train arrives. Hence, if the train is late due to certain reasons, then gate remain closed for a long time causing traffic near the gates. By employing the automatic railway gate control at the level crossing the arrival of the train is detected by the sensor placed near to the gate. Hence, the time for which it is closed is less compared to the manually operated gates and also reduces the human labour. This type of gates can be employed in an unmanned level crossing where the chances of accidents are higher and reliable operation is required. Since, the operation is automatic; error due to manual operation is prevented. Automatic railway gate control is highly economical microcontroller based arrangement, designed for use in almost all the unmanned level crossings in the country.

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): THIRD SEMESTER

BEME302T: KINEMATICS OF MACHINE (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week
Tutorial: 1 Hour/Week

Examination Scheme
Duration of Paper: 03 Hours
University Assessment: 80 Marks
College Assessment: 20 Marks

Course Objectives and Expected Outcomes: The study of kinematics is concerned with understanding of relationships between the geometry and the motions of the parts of a machine. The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to give desired motions. This course includes relative motion analysis, design of gears, gear trains, cams and linkages, graphical and analytical analysis of position, velocity and acceleration, clutches, brakes & dynamometers. Students will be able to understand the concepts of displacement, velocity and acceleration of simple mechanism, drawing the profile of cams and its analysis, gear kinematics with gear train calculations, theory of friction, clutches, brakes & dynamometers.

UNIT – I **[8 Hrs.]**

Basic concept of mechanism, link, kinematics pairs, kinematics chain, mechanism, Difference between machine and mechanism, Inversions, machine, simple & compound chain, Degrees of freedom, Estimation of degree of freedom of mechanism by Grubber's criterion and other methods. Harding's notations, Classification of four bar chain , Class-I & Class-II, Kutchbach theory, Various types of mechanism such as Geneva wheel, Paw1 and ratchet mechanism, Exact straight line mechanism, Approx. straight line mechanism, Transport mechanism.

UNIT – II **[8 Hrs.]**

Quantitative kinematics analysis of mechanisms: - Displacement, Velocity and Acceleration analysis of planer mechanism by graphical method as well as analytical method. Coriolis component of acceleration, Instantaneous center method, Kennedy's theorem.

UNIT – III **[8 Hrs.]**

Concepts of cam mechanism, Comparison of cam mechanisms with linkages. Types of cams and followers and their applications. Synthesis of cam for different types of follower motion like constant velocity, parabolic, SHM, cycloid etc.

UNIT – IV **[8 Hrs.]**

Concept of motion transmission by toothed wheels, comparison with cams and linkages, various tooth profiles, their advantages and limitations, gear tooth terminologies, concept of conjugate action, law of conjugate action, kinematics of involute gear tooth pair during the contact duration,

highlighting locus of the point of contact, arc of contact, numbers of pairs of teeth in contact, path of approach and path of recess, interference, undercutting for involute profile teeth.

Kinematics of Spiral and helical gears, Kinematic analysis and torque analysis of simple epicyclic gear train.

UNIT – V **[8 Hrs.]**

Synthesis of Mechanism:- Introduction to type, Number and dimensional synthesis, Synthesis of Mechanism by graphical method, Transmission angle, Freudenstein's equation, Roberts Cognate Linkage.

UNIT – VI **[8 Hrs.]**

Laws of friction, Friction of inclined plane, Efficiency of inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear. Clutches, Brakes & Dynamometers: Single, multiple and cone clutch, Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers (Numerical are expected on clutches and brakes only).

LIST OF TUTORIALS:

1) Drawing sheets on Inversion of
   i) Class I & Class II four bar chain
   ii) Single slider crank chain
   iii) Double slider crank chain
2) Problem on degree of freedom of mechanisms
3) Problems on kinematic analysis i) Graphical method ii) Analytical method
4) Cam constructions
5) Problem on gears
6) Analysis of epicyclic gear train with torque analysis
7) Problems on synthesis
   i) Graphical method
   ii) Analytical method
8) Study of construction and working with neat sketch of
   i) Clutches
   ii) Brakes
   iii) Dynamometers

TEXT BOOKS:

1. Theory of Machine, S. S. Rattan, Tata McGraw Hill.
2. Mechanism and Machine Theory, J.S. Rao & Dukki Patti, New Age International (P) Ltd, Publishers.
3. Theory of Machines, P L Ballaney, Khanna Publications.

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR(M.S)

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate

It is to certify that this is a bonafide record of Project Work entiled

"AN APPROACH TO DEVELOP A MECHANISM FOR UTILIZATION OF RECIPROCATING MOTION FOR ENERGY GENERATION"

Carried out by

Chhatrapati Hiwale(404)
Abhijit Kamdi(422)
Ankita Ablankar(430)
Abhishek Chavan(302)
Rushikesh Dange(341)
Kshitij Dahake(320)
Amol Bhandekar(431)

of 8th Semester
B.E.MECHANICAL ENGINEERING
during the academic year of 2019-2020 in partial fulfillment of the requirement for the award of the degree of
BACHELOR OF ENGINEERING
offered by

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR (M.S.)

Prof. S.P. LOKHANDE
(PROJECT GUIDE)

Dr. K. S. ZAKIUDDIN
(HEAD OF THE DEPT.)

Prof. S.P.LOKHANDE
(PROJECT COORDINATOR)

Dr. M. P. SINGH
(PRINCIPAL)

ABSTRACT

The intention of this project is to design a renewable energy source based on the exercise equipment. The energy from the different workout at the green gym equipment is usually wasted in the mechanism of the equipment. In now a days the population growth is increasing day by day and the scarcity of electricity is increases as the scarcity is directly proportional to the number of consumers.

The basic idea of this project is to modified a gym equipment in such a way that the mechanical Energy of the machine and converted it to electrical energy using a generator system. The exercise equipment is assembled to the shaft of the motor. The output i.e electrically energy is used to lightening the lamp etc.

We are using human power as a input source to the gym equipment. The main motto of modifications is the gym equipment is dual comfort that is the electricity generator and a fitness regulator. For this operation the reciprocating motion while pedaling is converted partially rotating motion by means of shaft. By partially rotating the different polarity charged get generated by for charged the battery the same polarity is managed through Bridge rectifier having 4 diode (4007) and the inverter is used to distributed this supply to the load.

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering and Technology
B.E. (MECHANICAL ENGINEERING): FOURTH SEMESTER

BEME404T: MACHINING PROCESSES (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week
Tutorial: 1 Hour/Week

Examination Scheme
Duration of Paper: 03 Hours
University Assessment: 80 Marks
College Assessment: 20 Marks

Course Objectives and Expected Outcomes: The study of machine tools & metal cutting is fundamental to mechanical engineering. This course includes the working of mechanisms of various machine tools and machining principles. The learning outcomes includes concept of theory of metal cutting & force analysis, understanding the objectives of the various machine tools, constructional details and mechanisms involved in various machine tools. This course is aimed also to identify the machining parameters, different types of cutting tool materials, cutting fluids and their properties. Upon completion of this course, students shall understand the importance of machining processes and be able to apply the suitable machining processes for an engineering product.

UNIT – I **[8 Hrs.]**

Introduction to Machining Parameters: Introduction to machining, Tool materials, nomenclature and tool geometry of single point cutting tool, tool materials properties, classification, HSS, carbide tool, coated tools, diamond coated tool.
Theory of Metal Cutting: Introduction. Orthogonal and Oblique cutting. Mechanics of Metal Cutting, shear plane, Stress, Strain and cutting forces. Merchant's circle, Chip formation, cutting force calculations, Determination of Torque and power required for turning Drilling and Milling. Influence of tool angle, cutting fluids, cutting speed, feed and depth of cut on power requirement, Estimation of tool life.

UNIT – II **[8 Hrs.]**

Lathe: Introduction. type, construction of simple lathe mechanism and attachments for various operations, machine specifications, basis for selection of cutting speed. feed and depth of cut, time estimation for turning operations such as facing, step turning, taper turning, threading, knurling.
Introduction to Capstan & Turret Lathe.

UNIT – III **[8 Hrs.]**

Shaper: Introduction, type, specification, description of machines, hydraulic drives in shapers, cutting parameters. Mechanism of shaper: Quick return mechanism, Crank & slotted link mechanism, Table feed mechanism, attachments for shaper, work holding devices, shaper operations, time estimation for shaping operations.
Slotter : Introduction, specifications, description, type of drives for slotter, types of slotting machines -production slotter, puncher slotter, tool room slotter, slotter tools. Planer: Introduction, specifications, description. type of planner, open side planner, pit planner Mechanism for planner: Driving mechanism, feeding mechanism, planner cutting tools, cutting parameters.

UNIT – IV **[8 Hrs.]**

Milling: Introduction. Specification, types, column & knee type milling machine, fixed bed type milling machines, production milling machines, special purpose milling machines such as thread milling Machines, profile milling machine, Gear Milling/Hobbing machines. Mechanisms & Attachments for Milling. Cutting, parameters, Types of milling operations, Types of milling cutters, Tool geometry & their specifications. Indexing- simple, compound and differential.

UNIT – V **[8 Hrs.]**

Grinding operations, grinding wheel, specifications & selection, cylindrical & centreless grinding operation, surface grinding, tool & cutter grinding, time estimation for grinding operations. Super finishing process: Honing, Lapping, super finishing, polishing, buffing, 'metal spraying, galvanizing and electroplating. Process parameters and attainable grades of surface finish, surface measurement.

UNIT – VI **[8 Hrs.]**

Drilling: introduction, tools for drilling, classification of drills, twist drills, drill size and specifications, tipped drills, type of drilling machines-portable drilling machine. bench drilling machine, right drilling machine, radial drilling machine, universal drilling machine, multisided drilling machine. Drilling machines operations, time estimation for drilling. Reaming: Introduction, description of reamer, type of reaming operations. Boring: Introduction, types of boring machine, horizontal boring machine, vertical boring machine, jig machine, micro boring. boring operations. Broaching: Introduction, type of broaches, nomenclature of broaches. types of broaching machines.

TEXT BOOKS:

1. Workshop technology (Vol. II), V. S. Raghuwanshi, Dhanpat Rai & Sons
2. Manufacturing Science, Ghosh & Mallik, East West Press
3. Manufacturing technology (Metal cutting & Machine tools) Vol. II, P. N. Rao, Tata Mc-Graw Hill
4. Workshop technology, H. S. Bawa, Tata Mc-Graw Hill
5. Introduction to Manufacturing Processes, J. A. Schey, Tata Mc-Graw Hill
6. Workshop Technology (Volume II), Hajra Chaudhary, Media Promoters & Publishers

REFERENCE BOOKS:

1. Manufacturing Engineering & Technology, S. Kalpakjian & S.R. Schmid
2. Technology of Machine Tools, Krar & Oswald
3. Manufacturing Processes, M. Begman
4. Processes & Materials of Manufacture, R. Lindberg
5. Production Technology, HMT

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR. (M.S.)

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate

It is to certify that this is a bonafide record of Project Work entitled

"ANALYSIS & FABRICATION OF REMOTE OPERATE 360° FLEXIBLE DRILLING MACHINE"

Carried Out By

MOHIT MESHRAM	REKHCHAND RAUT
ROHIT KHOBRAGADE	NITESH UPARE
ROHAN NAIK	

Of 8th Semester

B.E. MECHANICAL ENGINEERING

During the academic year of 2019 – 2020 in partial fulfillment of the requirement for the award of the degree of BACHELOR OF ENGINEERING offered by

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur (M.S.)

PROF. V. S. SHENDE
(Project Guide)

DR. K. S. ZAKIUDDIN
(Head of the Dept.)

PROF. S. P. LOKHANDE
(Project Coordinator)

DR. M. P. SINGH
(Principal)

ABSTRACT

Nowadays machines are widely controlled by embedded system, for this an effective control of machines are necessary. Drilling is one of the basic machining process of making holes and it is essentially for manufacturing industry like Aerospace industry, watch manufacturing industry, Automobile industry, medical industries and semiconductors. Our project can easily rotate and drill in any direction. Materials like plastic, wood and light metals can be drilled with this machine. In previous researches there were alignment problems. We can drill holes horizontally, vertically and upside down. This project uses hinges with motor and supporting structure. Our project deals with an interesting manner of drilling machine.

Keywords: Drilling machine. Automated, Remote.

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Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): FIFTH SEMESTER

BEME502T: DESIGN OF MACHINE ELEMENTS (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to understand the basic machine element design. It includes the procedure of design (w.r.t. basic failures) under various loading conditions. Students shall understand design of various mechanical joints, machine components such as shaft, keys, brakes clutches, power screws etc. Apart from this, students shall learn spring design & pressure vessel design. At the end of this course, students will get familiar with design of these mechanical components under various loading conditions.

UNIT – I **[12 Hrs.]**

Introduction to Mechanical Engineering Design, Design methods, Aesthetic and Ergonomics Consideration in design , Material properties and their uses in design , Basic 'principles of Machine Design, Modes of failures, I. S. codes, Preferred Series and numbers. Design of Knuckle joint, Socket & Spigot type cotter joint. Design of riveted joint.

UNIT – II **[12 Hrs.]**

Design of bolted and welded joints under axial and eccentric loading conditions. Design of Brackets & Levers.

Design of Cylinder & Pressure Vessels: Types of pressure vessel, stresses induced in pressure vessel, Lame's, Clavarino's and Bernie's equations. Design of cylindrical & spherical pressure vessels. Design of nut, bolt, gasket & covers for pressure vessel.

UNIT – III **[12 Hrs.]**

Design of shaft for power transmission, static and fatigue criteria for shaft design, ASME codes for shaft design, Design of keys.

Design of Springs: Spring material, Helical compression & tension springs under static and variable loads, Leaf spring, Laminated Springs.

UNIT – IV **[12 Hrs.]**

Design of power screw: Thread forms, multiple threaded screws, terminology of power screw, design of screw jack.

Design of clutches and brakes: Single and multiple plate clutch, constant wear and constant pressure theory for plate clutches, Internal and external shoe brakes.

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TEXT BOOKS:

1. Design of Machine Elements, B.D.Shiwalkar, Central Techno Publications
2. Design of Machine Elements, V. B. Bhandari, Tata McGraw Hill Pub.
3. Mechanical Engineering Design, J. E. Shigley, McGraw Hill.
4. Design Data Book, B.D.Shiwalkar, Central Techno Publications.
5. Design Data Book, PSG.
6. Design Data Handbook Book, K. Mahadevan, CBS Publishers.
7. Mechanical Design of Machine Elements & Machines, J.A.Collins, Wiley India
8. Machine Components Design, Robert C., Juvinall & Kurt M. Marshek, Wiley India
9. Machine Design, U.C. Jindal, Pearson Publications
10. Machine Design : An Integrated Approach, Robert L Norton, Pearson Publications
11. Machine Design Fundamental and Applications, P.C. Gope, PHI Learning.
12. Design of Machine Elements, Sharma C.S. & Purohit K, PHI Learning.

REFERENCE BOOKS:

1. Design of Machine Elements, Spotts M. F. and Shoup T. E., Pearson Publications.
2. Machine Design, Black P. H. and O. Eugene Adams, McGraw Hill Book Co Inc.

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR (M.S.)

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate

It is to certify that this is a bonafide record of Project Work entitled

"TRUCK LOADER AND UNLOADER"

Carried out by

1. CHETAN PATHODE
2. PAYUSH MENDHE
3. KUNAL DODKE
4. ROHIT BISEN
5. PRANAV KAHAR
6. KARAN MANTHANWAR

of 8th Semester

B.E.MECHANICAL ENGINEERING

during the academic year of 2019-2020 in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING

offered by

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR (M.S.)

Dr. P. B. KHOPE
(PROJECT GUIDE)

Prof. S. P. LOKHANDE
(PROJECT COORDINATOR)

Dr. K. S. ZAKIUDDIN
(HEAD OF THE DEPT.)

Dr. M. P. SINGH
(PRINCIPAL)

ABSTRACT

The objective of our project is to design and fabricate a system or a attached block to the vehicle. The main consideration of our project is to reduce the cost of transportation & to reduce the time of transportation. Here, we use some arrangement of machines and some joints due to which we can managed the proper loading and unloading of good. As the time for loading and unloading decreases, the transportation speed ultimately boost up and as the loading and unloading is done with the help of machine. The cost of loading and unloading also decreases and as the cost of goods also may affect. Here at least one labour can be used for the operating of machine which is sufficient for loading a truck and unloading the truck. The running cost and maintenance cost of the machine is also cheap as the single labour cost. The starting cost of machine is just expensive but once the construction of machine done then there will be no turning back of machine. It simple saves the time, cost and efforts of labours.

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering and Technology B.E.
(MECHANICAL ENGINEERING): SEVENTH SEMESTER

BEME702T2: ELECTIVE – I: TOOL DESIGN (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**	
Lectures: 3 Hours/Week	Duration of Paper:	03 Hours
Tutorial: 1 Hour/Week	University Assessment:	80 Marks
	College Assessment:	20 Marks

Course Objectives and Expected Outcomes: This course deals with various types of cutting tools, the mechanics of metal cutting, design of gauges, design of metal cutting tools and also to understand various press working operations along with die design for sheet metal working, basics of forging dies and design of jigs and fixtures.

UNIT – I **[8 Hrs.]**

Theory of metal cutting: Introduction, cutting tool materials, different types of cutting tools used for machining, designation of cutting tools, different types of systems used for designating cutting tools, types of chips, Merchant's theory, determination of shear angle, velocity and force relationship, cutting power, energy. Tool wear, tool life criteria, variables affecting tool life, machinability.

UNIT – II **[8 Hrs.]**

Design of cutting tools: Design of single point cutting tools and form tools. Drills- Introduction, types, geometry, design of drills. Milling cutters – Introduction, types, geometry and design of milling cutters. Reamers, taps and broaches – Constructional features only.

UNIT – III **[8 Hrs.]**

Press working (Cutting operation dies): Introduction, different types of operations performed on presses, different types of presses, capacity calculation of presses. Different types of dies- Simple dies, compound dies, progressive dies, combination dies, transfer dies. Cutting operations, cutting force, methods for reducing cutting forces, cutting clearance, effect of cutting clearance on sheet metal, design of various types of dies for cutting operation.

UNIT – IV **[8 Hrs.]**

Press working (Bending. Forming & Drawing dies):

Bending: Bending terminology, types of bending operation, blank development, spring back and its prevention, bending force and design of bending dies.

Forming: Introduction, types of forming dies - Solid form dies, pad type form dies, curling dies, embossing dies, coining dies and its design.

Drawing: Metal flow in drawing operation, factors affecting metal flow, calculation of number of draws, development of blank, drawing force, blank holding force and design of various types of drawing dies i.e. single action draw die, double action draw die and inverted dies.

UNIT – V **[8 Hrs.]**

Forging die design: Introduction, classification of forging dies, single impression dies, multiple impression dies. Forging design factors – Draft, fillet and corner radius, parting line, shrinkage and

die wear, mismatch, finish allowances, webs and ribs. Preliminary forging operations – Fullering, edging, bending, drawing, flattering, blacking, finishing, cut off.

Die design for machine forging - Determination of stock size in closed and open die forging. Tools for flash trimming and hole piercing, materials and manufacture of forging dies.

UNIT – VI **[8 Hrs.]**

Design of jigs and fixtures: Introduction, concept of degrees of freedom, 3-2-1 principle of location, principles of location and clamping for jig and fixtures design, different types of locators and clamps, jig bushes, its types, materials and heat treatments, different types of jigs and its design.

Essential features of different types of fixtures, design of fixtures, indexing jigs and fixtures. automatic clamping devices.

LIST OF TUTORIALS: Tutorials based on above syllabus.

TEXT BOOKS:

1. Tool Design, Donaldson, Tata Mc-Graw Hill.
2. Fundamentals of Tool Design, Kempster
3. Computer Aided Fixture design, Rongi Yeming, Marcel Dekker Inc. NY.
4. Unconventional Clamping Systems by Juran and Grant.
5. Jigs and Fixtures Design by Joshi, Tata McGraw Hill.
6. Tool Design, S. K. Basu, India Book House.

REFERENCE BOOKS:

1. Fundamentals of Tool Design, Pollock, Reston Publishing Company.
2. Fundamentals of Tool Design, ASTME, Tata McGraw Hill.

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR (M.S.)

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate

It is to certify that this is a bonafide record of Project Work entitled

"STRUCTURAL DESIGN OF TWO STATION NOTCHING TOOL DIE AT 5S INDUSTRIES"

Carried out by

113 Akshay B. Wadatkar	**143 Roshan P. Ukey**
127 Hitesh Kumar	**151 Shesh S. Obilwar**
137 Pramod R. Kushwaha	**233 Tejas V. Gadge**

Of 8th Semester

B.E. MECHANICAL ENGINEERING

During the academic year of 2019-20 in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING

Offered by

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR (M.S.)

Dr. S.N. Waghmare
(PROJECT GUIDE)

Prof. S. P. LOKHANDE
(PROJECT COORDINATOR)

Dr. K. S. ZAKIUDDIN
(HEAD OF THE DEPT.)

Dr. M. P. SINGH
(PRINCIPAL)

ABSTRACT

Die is one of the most important tools used in production industries for producing components from the sheet metal / plate. Die is a rigid metallic block with a special shape cut into it that is used for shaping other portions of metal sheet. Die is an integral part of the press tool which is mounted on the press machine to carry out various operations. Depending on the combination of "die and punch" used in press tool assembly, processes such as punching, blanking, piercing, notching etc. are carried out.

Notching is a sheet metal cutting operation in which a tiny scrap piece is eliminated from the skin fringe of the work. A better die design and press tool assembly tends to achieve effective notching operation. Structural rigidity is one of the key factor which is to be consider while designing the die. Higher the structural rigidity, lower will be the chances of failure. If the structural stability of the die will be less it can easily fail while performing its functions. Hence, to improve the structural rigidity (stability) of the die stress concentration factor is to be lower.

To overcome the chances of failure and improve the structural rigidity of notching die, new die is to be design which can perform better under the working environment. Lowering the stress concentration factor of the current die (which has abrupt change in area) can improve the structural rigidity. Therefore, designing a new die is the main objective of this project. A filleted die is designed so that stress can be reduced and load is distributed over the area so that the chances of failure are reduced. Designing and analysis of this die is done under the working environment and found its successful working. Hence, new filleted die produced which has better structural stability, higher production rate and less chances of failure in a working environment.

This work can be referred for study and analysis of die on ANSYS for a similar problem in the future if arises and effective solution can be drawn. Providing a cost-effective solution to the problem, minimization of the stresses involved, designing a new die which has minimal stress concentration factor are the main areas of research of this project

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): EIGHTH SEMESTER

BEME803T3: ELECTIVE-III: RENEWABLE ENERGY SYSTEMS (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**	
Lectures: 3 Hours/Week	Duration of Paper:	03 Hours
Tutorial: 1 Hour/Week	University Assessment:	80 Marks
	College Assessment:	20 Marks

Course Objectives and Expected Outcomes : This course is designed to make the students conversant with the non conventional energy sources and their utilization to harness power. The students will learn the solar energy utilization with its applications. The students will also understand the various methods by which energy can be generated from wind, ocean tides, Geo-thermal phenomenon, Biogas and MHD. At the end of this course, students will appreciate the importance of renewable energy systems & will be able to build them.

UNIT – I **[8 Hrs.]**

Solar Energy: Introduction, solar constant, spectral distribution of solar radiation, beam & diffuse radiation, measurement of solar radiation and measuring instruments. Solar radiation geometry, solar angles, estimation of average solar radiation, radiation on tilted surface, tilt factors, solar fuel cell.

UNIT – II **[8 Hrs.]**

Solar flat plate collectors: Types of collectors, liquid flat plate collectors, solar air heaters, transmissivity of glass cover system, collector efficiency, analysis of flat plate collector, fin efficiency, collector efficiency factor and heat removal factor, selective surfaces, evacuated collectors, novel designs of collector.

UNIT – III **[8 Hrs.]**

Concentric collectors: line focusing, point focusing and non focusing type, central receiver concept of power generations, compound parabolic collector, comparison of flat & concentric collectors. Applications of solar energy to water heating, space heating, space cooling, drying refrigeration, distillation, pumping. Solar furnaces, solar cookers, solar thermal electric conversion, solar photo-voltaics. Solar energy storage, sensible, latent and thermo chemical storage, solar pond.

UNIT – IV **[8 Hrs.]**

Biogas: - Introduction, bio gas generation, fixed dome & floating drum biogas plants, their constructional details, raw material for biogas production, factors affecting generation of biogas and methods of maintaining biogas production, digester design considerations, fuel properties of biogas and utilization of biogas.
Bio Mass :- Introduction, methods of obtaining energy from biomass, Incineration, thermal gasification, classification of gasifiers & constructional details, chemistry of gasification, fuel properties, applications of gasifiers.

UNIT – V **[8 Hrs.]**

Wind and Ocean energy: - Power in wind, forces on blades. Wind energy: Basic principle of wind energy conversion, site selection consideration, wind data and energy estimation. Basic components of WECS classification of WEC systems, Savonius and Darrieus rotors applications of wind energy.

Ocean energy: Introduction, ocean thermal electric conversion, open and closed cycle of OTEC, hybrid cycle, energy from tides, basic principles of tidal power & components of tidal power plants. Single & double basin arrangement, estimation of tidal power and energy.

UNIT – VI **[8 Hrs.]**

Geothermal and MHD power generation:
Geothermal energy: Introduction, classification of geothermal systems, vapour dominated, liquid dominated system, total flow concept, petrothermal systems, magma resources, applications of geothermal operational & environmental problems.
Magneto Hydro Dynamic power generation: Introduction, principles of MHD power generation, MHD open and closed systems, power output from MHD generators.

LIST OF TUTORIALS: Tutorials based on above syllabus.

TEXT BOOKS:

1. Renewable Energy Recourses: Basic Principle and Applications: G.N.Tiwari and M.K. Ghosal, Narosa publication.
2. Non-Conventional Energy Resources: B.H. Khan, Tata McGraw Hill.
3. Solar Energy Utilization, G.D. Rai. Khanna pulishers.
4. Industrial Energy Conservation, D. A. Ray, Pergaman press.

REFERENCE BOOKS:

1. Non-Conventional Energy Sources , G.D. Rai, Khanna publishers.
2. Solar Energy, S.P. Shukhatme, Tata McGraw Hill Education.
3. Renewable Energy Sources and Emerging Tech., Kothari. PHI.

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR(M.S)

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate

It is to certify that this is a bonafide record of Project Work entiled

"AN APPROACH TO DEVELOP A MECHANISM FOR UTILIZATION OF RECIPROCATING MOTION FOR ENERGY GENERATION"

Carried out by

Chhatrapati Hiwale(404)
Abhijit Kamdi(422)
Ankita Ablankar(430)
Abhishek Chavan(302)
Rushikesh Dange(341)
Kshitij Dahake(320)
Amol Bhandekar(431)

of 8th Semester
B.E.MECHANICAL ENGINEERING
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(HEAD OF THE DEPT.)

Dr. M. P. SINGH
(PRINCIPAL)

ABSTRACT

The intention of this project is to design a renewable energy source based on the exercise equipment. The energy from the different workout at the green gym equipment is usually wasted in the mechanism of the equipment. In now a days the population growth is increasing day by day and the scarcity of electricity is increases as the scarcity is directly proportional to the number of consumers.

The basic idea of this project is to modified a gym equipment in such a way that the mechanical Energy of the machine and converted it to electrical energy using a generator system. The exercise equipment is assembled to the shaft of the motor. The output i.e electrically energy is used to lightening the lamp etc.

We are using human power as a input source to the gym equipment. The main motto of modifications is the gym equipment is dual comfort that is the electricity generator and a fitness regulator. For this operation the reciprocating motion while pedaling is converted partially rotating motion by means of shaft. By partially rotating the different polarity charged get generated by for charged the battery the same polarity is managed through Bridge rectifier having 4 diode (4007) and the inverter is used to distributed this supply to the load.