

Detailed Course Scheme
Bachelor of Technology (B.Tech.)
(Mechanical Engineering)

Semester-IV
(2016-20)

DOC201712080017



RNB GLOBAL UNIVERSITY
RNB Global City, Ganganagar Road,
Bikaner, Rajasthan 334601

OVERVIEW

RNB Global University follows Semester System. Accordingly, each academic year is divided into two semesters, **Odd (July-December) and Even (January-June)**. Besides this, the university follows a system of continuous evaluation along with regular updating in course curricula and teaching pedagogy.

The curriculum for B.Tech Program for (January- June) Even Semester, 2018 along with examination pattern is as follows:

Course Scheme

Semester -IV

S. No.	Course Code	Course Title	Credits
1.	19004300	Manufacturing Science-II	3
2.	19004400	Manufacturing Science-II Lab	1
3.	19004500	Fluid Mechanics	3
4.	19004600	Fluid Mechanics Lab	1
5.	19004700	Measurements and Instrumentation	3
6.	19004800	Measurements and Instrumentation Lab	1
7.	19004900	Theory of Machines	3
8.	19005000	Theory of Machines Lab	1
9.	19005100	I.C Engines	3
10.	19005200	I.C Engines Lab	1
11.	11017100	Organizational Behaviour	2
12.	19006200	Ability & Skill Enhancement Module IV	3
13.	99002000	NSS/NCC /Similar Activities	-
14.	99002100	Club Activities	-
15.	99001700	Seminar	-
Total Credits			25

EVALUATION SCHEME- THEORY

The evaluation of the theory paper of B.Tech would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessments as follows:

Internal Assessment

Area of Assessment	Marking	Maximum Marks
Sessional-I	As per marks obtained	10
Sessional-II	As per marks obtained	10
Assignment + Presentation	15	15
Overall Conduct and Discipline	To be decided by concerned Faculty Member	5
Attendance	Student with 80% attendance will get 5 marks and 0.25marks for every1% attendance above 80%	10
Total	50	

External Assessment

Type	Marks
Theory	50

EVALUATION SCHEME -PRACTICAL

The evaluation of the practical paper of B.Tech would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessment is as follows:

Internal Assessment

Type	Details	Marks
Marks obtained in various manuals, practical file, participation, any model prepared, output of practical	Average of marks obtained	35
Discipline	To be decided by concerned faculty	5
Attendance	80% - 5 marks and 0.25 percent for every one percent above 80 %	10
TOTAL	50	

External Assessment

Type	Marks
Practical	50

EVALUATION SCHEME- NSS/NCC AND CLUB ACTIVITIES

1. NSS/NCC /Similar activities prescribed by University will be completed from Semester I – Semester VI. It will be evaluated internally by the respective institute. The credit for this will be given after VIth Semester.
2. The students have to join club/clubs with the active participation in different activities of club. The students would be continuously assessed from Semester I – Semester VI and credits and marks would be given after VIth Semester.

CURRICULUM

Course Name: Manufacturing Science-II

Course Code: 19004300

Course Outline

Unit I Mechanism of Metal Cutting: Deformation of metal during machining, nomenclature of lathe, milling tools, mechanics of chip formation, built-up edges, mechanics of orthogonal and oblique cutting, Merchant cutting force circle and shear angle relationship in orthogonal cutting, factors affecting tool forces. Cutting speed, feed and

depth of cut, surface finish. Temperature distribution at tool chip interface. Numericals on cutting forces and Merchant circle.

Unit II Cutting Tool Materials & Cutting Fluids: Characteristics of tool materials, various types of cutting tool materials, coated tools, cutting tool selection, Purpose and types of cutting fluids, basic actions of cutting fluids, effect of cutting fluid on tool life, selections of cutting fluid.

Unit III Tool Wear and Machinability: Types of tool wear, tool life, factors governing tool life, Machinability: Definition and evaluation. Economics of machining, Numerical on tool life

Unit IV Gear Manufacturing: Introduction, methods of manufacture. Gear generation and forming: Gear cutting by milling, single point form tool, gear hobbing and shaping. Gear finishing operations: Gear shaving, gear burnishing, gear grinding, lapping

Unit V Unconventional Machining Processes: Abrasive jet machining: Principles, applications, process parameters. Ultrasonic machining: Principles, applications, analysis of process parameters. Electro-chemical machining and grinding: Principles, classifications, choice of electrolytes, applications. Electric discharge machining: Principles, selection of tools materials and dielectric fluid. Electron beam machining: Generation of electron beam, relative merits and demerits. Laser beam machining: Principles and applications

Unit VI Jigs & Fixtures: Introduction, location and location devices, clamping and clamping devices, Drill Jigs, Milling Fixtures

Unit VII Advance welding process: Tungsten inert gas welding (TIG), metal inert gas welding (MIG), MMAW, electron beam welding, friction welding, and diffusion welding: Their working principle, equipments, parameters and applications

Unit VIII Metrology & Machine Tools Testing: Tolerances, limits and fits, methods of linear measurement and angular measurement, Go and No Go gauges. Introduction to Machine tools testing, measuring instruments used for testing, test procedures, acceptance tests of machine tools.

Suggested Readings:

1. Manufacturing Technology – Metal cutting and machine Tools: P.N. Rao, T.M.H, New Delhi.
2. Introduction to Jig and Tool Design: Kempster M.H.A, Hodder & Stoughton, England
3. Principles of Machine Tools – G.C. Sen & A. Bhattacharya, Tata McGraw Hill, New Delhi.
4. Manufacturing Engg. & Tech, Kalpakian, Serop Addison -Wisly Publishing Co. New York.

5. Modern Machining Processes: P.C. Pandey & H.S. Shan, T.M.H. Company, New Delhi
Text Book of Production Engineering: P.C. Sharma, S.Chand & Sons.

Course Name: Manufacturing Science-II Lab

Course Code: 19004400

Course Outline

List of Experiments

1. Gear cutting on milling machine (Spur Gear).
2. Bolt making on lathe machine
3. Arc Welding experiment.
4. Finishing of a surface on surface-grinding machine.
5. Machining a block on shaper machine.
6. Experiment on tool wear and tool life.
7. Soldering and Brazing Experiment
8. Drilling holes on drilling machine

Course Name: Fluid Mechanics

Course Code: 19004500

Course Outline:

Unit I Fundamental Concepts of Fluid Flow: Fundamental definitions, Fluid properties, classification of fluids, Flow characteristics, Foundations of flow analysis, Incompressible and compressible fluids, one, two and three dimensional flows, Pressure and its measurements: Pascal's law, pressure variation in a fluid at rest, Classification of different manometers.

Fluid Statics: Fluid pressure, Forces on solid surfaces, Buoyant forces, Meta centre and Metacentric height. Stability of floating bodies,

Unit II Kinematics of Fluid Flow: Types of fluid flow, streamline, path line and streak line; continuity equation, Equations for acceleration, Irrotational and rotational flow, velocity potential and stream function, Vortex flow, Continuity equation.

Dynamics of Fluid Flow: Control volume analysis, Eulers equation of motion, Bernoulli's equation, Bernoulli's theorems from steady flow energy equation, Venturi meter; Pitot tube, Momentum equation.

Laminar Flow: Reynold's experiment, Critical velocity, Steady laminar flow through a circular tube, Measurement of viscosity.

Unit III Turbulent Flow: Shear stress in turbulent flow. Hydro dynamically smooth & rough boundaries. Velocity distribution for turbulent flow in smooth and rough pipes.

Boundary Layer Flow: Boundary Layer Theory and Applications: Boundary Layer thickness, displacement, momentum and energy thickness, Flow separation, Drag and lift on immersed bodies.

Pipe Flow Systems: Darcy-Weisbach equation, Moody diagram, Energy losses in pipelines, concept of equivalent length, Flow between two reservoirs multiple pipe systems. Siphon.

Unit IV Dimensional Analysis and Principles of Similarity: Buckingham's Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers- Reynolds, Froude, Euler, Mach, Weber Number and their significance.

Flow Measurements: Measurement of flow using, orifice meter, nozzle, Measurement of flow in open channels – rectangular, triangular, trapezoidal weir, Cipoletti weir. Hot-wire anemometer.

Suggested Readings:

1. R.K. Basal, "Fluid Mechanics & Hydraulic Machines", LaxmiPublications(P) Ltd.,2002.
2. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons,2000.
3. I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
4. V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill
5. Modi, P.N., and Seth, S.H., "Hydraulics and Fluid Machines", Standard Book House,
6. Vijay Gupta and S.K.Gupta, "Fluid Mechanics and its Applications", Wiley Eastern Ltd,
7. Som, S.K. & Biswas G. : Introduction of fluid mechanics & Fluid Machines, TMH, 2000,

Course Name : Fluids Mechanics Lab

Course Code: 19004600

Course Outline

List of Experiments

1. To determine the coefficient of impact for vanes.
2. To determine coefficient of discharge of an orificemeter.
3. To determine the coefficient of discharge of Notch (V and Rectangular types)
4. To determine the friction factor for the pipes.
5. To determine the coefficient of discharge of venturimeter.
6. To determine the coefficient of discharge, contraction & velocity of an orifice.
7. To verify the Bernoulli's Theorem.
8. To find critical Reynolds number for a pipe flow.
9. To determine the meta-centric height of a floating body.

10. To determine the minor losses due to sudden enlargement, sudden contraction and bends.
11. To show the velocity and pressure variation with radius in a forced vortex flow.

Course Name: Measurements & Instrumentation

Course Code: 19004700

Course Outline:

Unit I Introduction of Measurement: Block diagram and components of measuring instrumentation system, classifications of instruments, static and dynamic characteristic of instruments. Errors in measurements: gross errors, systematic errors. Calibration of instruments: process of calibration, standard of calibration and classification of standard.

Different Sensors:

Introduction sensing element used in temperature, pressure, force, torque and flow measurement. Transducers: Introduction and classification.

Unit II Transducers: Constructional features, working principle and applications of resistive, Inductive, Capacitive, Photoelectric, magnetostrictive, Ionization, piezoelectric, hall effect, Thermoelectric and digital transducers.

Unit III Measurement of Pressure: Classification of pressure measuring devices, high pressure and low pressure measurement, Vacuum pressure measurement.

Measurement of Flow: Method of flow measurement, obstruction meters, electromagnetic flow meters, hot wire anemometer, ultrasonic flow meter.

Unit IV Measurement of Temperature: Thermometer, thermocouples, thermistors, resistance thermometers and pyrometers.

Strain Gauges and Related Measurement: Electric resistance strain gauge, semiconductor strain gauge, temperature problems and compensation, applications of strain gauges in measurement, Measurement of Force, Displacement, Rotating speed, torque, Level, Humidity and Moisture.

Suggested Readings:

1. D. V. S. Murty, "Transducers and Instrumentation", PHI Learning Pvt. Ltd
2. A. K. Shawney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Sons Publications, 2000
3. E.O. Doebelin, Dhanesh N Manik, "Measurement Systems", 6th Edition, McGraw Hill Education.
4. John P. Bentley, "Principles of Measurement System", 4th Edition, Pearson Prentice Hall
5. D. Patranabis, "Sensors and Transducers", PHI Learning Pvt. Ltd., 2nd edition

Course Name: Measurements and Instrumentation Lab

Course Code: 19004800

Course Outline

List of Experiments

1. To Study various Temperature Measuring Instruments and to Estimate their Response times.
2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a deadweight pressure gauge calibration set up.
3. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple experimental set up to measure a small displacement.
4. To study the characteristics of a pneumatic displacement gauge.
5. To measure load (tensile/compressive) using load cell on a tutor.
6. To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer. To measure the speed of a motor shaft with the help of non-contact type pick-ups (magnetic or photoelectric).
7. To measure the stress & strain using strain gauges mounted on simply supported beam/cantilever beam.
8. To measure static/dynamic pressure of fluid in pipe/tube using pressure transducer/pressure cell.

Course Name: Theory of Machines

Course Code: 19004900

Course Outline:

Unit I General concepts, Velocity and Acceleration Analysis: Introduction of Simple mechanism, Different types of Kinematics pair, Grublers rule for degree of freedom, Grashof's Criterion for mobility, inversions of four bar chain, slider crank chain and double slider crank chain, Velocity of point in mechanism, relative velocity method, Velocities in four bar mechanism, slider crank mechanism and quick return motion mechanism, Instantaneous center method, Types & location of instantaneous centers, Kennedy's theorem, Velocities in four bar mechanism & slider crank mechanism Acceleration of a point on a link, Acceleration diagram, Coriolis component of acceleration, Crank and slotted lever mechanism, Klein's construction for Slider Crank mechanism and Four Bar mechanism, Analytical method for slider crank mechanism.

Unit II Mechanism with lower pairs: Description of Straight line mechanisms like Peaucellier's mechanism and Hart mechanism, Engine indicator mechanism, Steering mechanism of vehicles, Hook's joints.

Cams: Classification, Cams with uniform acceleration and retardation, SHM, Cycloidal motion, oscillating followers.

Unit III Friction: Concepts of frictions and wear related to bearing and clutches, Belt and pulley drive, Length of open and cross belt drive, Ratio of driving tensions for flat belt drive, centrifugal tension, condition for maximum power transmission, V belt drive **Brakes & Dynamometers:** Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers.

Unit IV Gears: Simple gear train, Compound gear train, Reverted gear train, trains – Analysis by tabular and relative velocity method, fixing torque, Sun and planet gear, Geometry of tooth profiles, Law of gearing, involute profile, Path of contact. Arc of contact, Contact ratio, Interference in involute gears. Methods of avoiding interference, Back lash. Comparison of involute and cycloidal teeth. Profile Modification., helical, spiral and worm gears.

Suggested Readings:

1. Theory and Machines: S.S. Rattan, Tata McGraw Hill.
2. Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition, MGH, New York
3. Thomas Beven, "The Theory of Machines", CBS Publishers,
4. V.P. Singh, "Theory of Machines", Dhanpat Rai & Co.(P)Ltd
5. Malhotra & Gupta, "The Theory of Machine", Satya Prakashan,.
6. Ghosh A & Malik A K " Theory of Mechanisms and Machines" Affiliated East West Press

Course Name: Theory of Machines Lab

Course Code : 19005000

Course Outline

List of Experiments

1. To determine whirling speed of shaft theoretically and experimentally.
2. To determine the position of sleeve against controlling force and speed of a Hartnell governor and to plot the characteristic curve of radius of rotation.
3. To determine the natural frequency of undamped torsional vibration of a single rotor shaft system.
4. To determine the natural frequency of undamped torsional vibration of two rotor shaft system.
5. To analyse the motion of a motorized gyroscope when the couple is applied along its spin axis.
6. To determine the frequency of undamped free vibration of an equivalent spring mass system.
7. To determine the frequency of damped force vibration of a spring mass system.

8. To study the static and dynamic balancing using rigid blocks

Course Name : IC Engines

Course Code : 19005100

Course Outline:

Unit I Introduction: Basic Engine components and Nomenclature, Classification of Engines, The working principle of Engines, Comparison of 2-Stroke and 4-Stroke Engines; CI, and SI Engines, Ideal and Actual Working Cycles and their analysis, Valve timing Diagram.

Fuels: Fossil fuels, Chemical structure of Petroleum, Properties of SI and CI Engine Fuels, Fuel Ratings; Octane Number, Cetane Number.

Unit II Carburetors & Fuel Injection: Air Fuel Mixture Requirements, Construction and Working of Simple Carburetor, Calculation of Air-Fuel Ratio, Parts of Carburetor.

Requirement of Injection Systems, Classification of Injection Systems, Fuel Feed pump, Injection Pumps, Working principles of Governors, Nozzles and Fuel Injector, Injection in SI and CI Engines.

Combustion and Ignition Systems in SI and CI Engines: Normal and Abnormal Combustion in SI and CI Engines, Stages of Combustion, Detonation and Knocking.

Unit III Performance parameters for IC Engines: Engine Power, Engine Efficiencies, Performance Characteristics, Variables Effecting Performance Characteristics, Methods of Improving Engine Performance, Heat Balance.

Modern Automotive Engines: Changes in Fuel injection Methods in S.I and C.I engines, Common Rail Direct Injection System, Gasoline Direct Injection, Variable Valve Technology, A brief review of Design changes to achieve high efficiency.

Gas Turbine: Introduction to Gas Turbines, Development, Classification and Application of Gas Turbines, Ideal and Actual Cycles; Effect of Intercooling, Reheating, Regeneration, Combined cycle and Cogeneration.

Gas Turbine Cycles for Aircraft Propulsion: Criteria of performance, Intake and propelling nozzle efficiencies, Simple Turbojet Cycle, The turboprop engine, Thrust augmentation, Gas turbine combustion systems, Combustion chamber designs, Gas Turbine Emissions.

Suggested Readings:

1. Ganesan V., "Internal Combustion Engines", Tata Mcgraw-Hill
2. HIH Saravanamuttoo, H. Cohen, GFC Rogers "Gas Turbine Theory", Pearson.
3. John B Heywood, "Internal Combustion Engine Fundamentals", Tata McGraw-Hill.
4. K.K. Ramalingam, " Internal Combustion Engines" 2nd ed, SCITECH Publications.
5. E.T. Vincent "Theory & Design of Gas Turbine and Jet Engine" Tata McGraw Hill.

6. Gas Turbine Principles and Practice, Cox Newnes.

Course Name : IC Engines Lab

Course Code: 19005200

Course Outline

List of Experiments

1. To Study four strokes spark ignition (S.I) Engine and differences between S.I. and C.I engines.
2. To study two Strokes S.I. engine and differences between two strokes and four strokes engines.
3. To study battery ignition system for four cylinders S.I. engines and requirements of ignition system
4. To study magneto ignition system for SI engine having four cylinders and differences between magneto and battery Ignition system.
5. Study of carburettor with compensating and starting Jet devices
6. Determination of Brake power (BP), friction power (FP) and Indicated power (IP) of four stroke four cylinder diesel engine with rope break dynamometer
7. To determine Mechanical efficiency, Brake thermal efficiency and indicated thermal efficiency of four strokes, four cylinder diesel engine.
8. To draw heat balance sheet for four stroke, four cylinder diesel engines. To study open cycle constant pressure combustion gas turbine with inter cooler, regenerator and reheater.
9. To study centrifugal compressor and differences between centrifugal and Axial compressors.

Course Name: Organizational Behavior

Course Code: 11017100

Course Outline:

Unit I Introduction to Organizational Behaviour: Today's Organizations, Challenges, Foundations of Organizational Behaviour, Individual Behaviour: Perception, Values, Attitudes Motivation theories. Employees Motivations in Organization, Management by Objectives Learning Processes, Reward and Punishment.

Unit II Foundations of Group Behaviour: Interpersonal Communication, Leadership, Emotional Intelligence. Power & Politics, Conflict Process, Negotiations, Stress and Coping, Inter-Group Relations, Team Working.

Unit III A Macro Perspective of Organizational Behaviour: Organization Structure – Key Elements, Types and Basic Models, Work Design, Organizational Change, and Learning Organizations.

Unit IV Organizational Behaviour: Future Challenges Gender Diversity at the place of work, Changing world Scenario, Role of External Environment.

Achieving Competitive: Advantage Management of change, International issues in Organizational Behaviour.

Suggested Readings

1. Robbins, S.P., Organizational Behaviour, PHI (2007) 8th ed.
2. Luthans F., Organizational Behaviour, Irwin Mc-Graw Hill. (2007) 11th ed.
3. Hellriegel, D., and Slocum, J.W., Organizational Behaviour, Southwestern Educational Publishing (2008).

Course Name: Ability & Skill Enhancement Module- IV

Course Code: 19006200

Course Outline - Final Assessment – Mock Interviews & PI Kit Submission

Unit I - Tele – Etiquettes Receiving Calls, Placing a call, Ending Calls, Transferring calls, Taking Message/ Voice Mails, Placing call on hold, Handling Complaints.

Unit II – Confidence Building & Brain Storming How to build confidence by positive thinking, identifying negative thoughts, how to control negative thoughts entering our mind, identifying personal talents, and its ways to improve, how to develop good habits and having principles and follow them at all times.

Need to learn new things, ideas and skills, what is brain storming, why do we need it, what are the different ways of brain storming through logics and reasoning, Brain Storming Session.

Unit III – PI Kit What is resume, Format of Resume, Formatting, Resume Preparation, Covering Letter, PI Kit.

Unit IV - Interview Skills Mastering the art of giving interviews in - selection or placement interviews, web /video conferencing, Mock Interview, HR Expert Mock Interview, Telephonic Interviews.

Unit V – Internship Preparation: Company Specific Research and Presentation Identifying domain specific industries, researching the industry, Industry analysis, Presentation on specific industry/company.

Note : The review of syllabus happens of periodic basis for the benefit of students and in case there are changed in curriculum due to review, students would be intimated in writing

----- **End of document**-----