Fifth Semester

B. Tech (5th Semester) Mechanical Engineering							
HM-905	**ENTREPRENEURSHIP**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs)**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3**
Purpose	To acquaint the knowledge about the entrepreneurship and entrepreneurial process in context of economic development, formalities required in launching a small enterprise, venture capital financing schemes and IPR.						
Course Outcomes							
CO1	Students will be able to understand: who the entrepreneurs are? what competencies are required to become an Entrepreneur?						
CO2	Students will have insights into the management, opportunity search, identification of a product, process of project finalization etc. required for small business enterprises.						
CO3	Students will be able to understand the meaning of small scale enterprise (SSE) and the setup formalities, operational and project management issues in the SSE.						
CO4	Students be able to know the different financial assistances available for the establishment of small scale industrial units and the IPR related issues.						

UNIT-I

Entrepreneurship: Concept and definitions, Entrepreneurship and economic development, classification and types of entrepreneurs, entrepreneurial competencies, factor affecting entrepreneurial Growth– economic, non-economic factors, EDP programmes, entrepreneurial training, traits/qualities of an entrepreneurs, manager vs entrepreneur, entrepreneurial challenges.

UNIT-II

Establishing Small Scale Enterprise: Opportunity scanning and identification, creativity and product development process, market survey and assessment, choice of technology and selection of site.

Planning a Small Scale Enterprises: Financing new/small enterprises, techno-economic feasibility assessment, preparation of business plan, forms of business organization/ownership.

UNIT–III

Small Enterprises and Enterprise Launching Formalities: Definition of small scale, rationale, objective, scopes, SSI, registration, NOC from pollution board, machinery and equipment selection, MSMEs – definition and significance in Indian economy, MSME schemes, operational issues in SSE: financial management issues, operational/project management issues in SSE, marketing management issues in SSE.

UNIT–IV

Institutional Interface for Small Scale Industry/Enterprises, Venture Capital: Concept, venture capital financing schemes offered by various financial institutions in India, legal issues–forming business entity, requirements for formation of a private/public limited company, entrepreneurship and Intellectual property rights: IPR and their importance (Patent, Copy Right, Trademarks), case studies-at least one in whole course.

Text books:

1. Entrepreneurship Development Small Business Enterprises by Poornima M Charantimath, Pearsons pub.
2. Entrepreneurship by Roy Rajiv, Oxford University Press.
3. Innovation and Entrepreneurship by Drucker. F, Peter, Harper business.
4. Entrepreneurship by Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, Tata Mc-Graw Hill Publishing Co. ltd. New Delhi.

Reference books:

1. Entrepreneurial Development by Dr. S.S. Khanka, S. Chand Publishing Company.
2. Entrepreneurship and Management of Small and Medium Enterprises by Dr. Vasant Desai, Himalaya Publishing House.

Note: The paper setter will set the paper as per the question paper template provided.

B. Tech (5th Semester) Mechanical Engineering							
MEC- 301	**HEAT TRANSFER**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs)**
3	**1**	**0**	**4**	**75**	**25**	**100**	**3**
Purpose	To build a solid foundation in heat transfer and rigorous treatment of governing equations and solution procedures.						
Course Outcomes							
CO1	After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer.						
CO2	The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer.						
CO3	The students will be able to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.						

UNIT-I

Introduction: Definition of heat, modes of heat transfer, basic laws of heat transfer, application of heat transfer, simple problems.

Conduction: Derivation of heat balance equation - steady one dimensional solution for conduction heat transfer in Cartesian, cylindrical and spherical geometry, concept of conduction and film resistances, steady one dimensional heat conduction without internal heat generation, the plane slab, the cylindrical shell, the spherical shell, conduction through composite wall, critical insulation thickness, variable thermal conductivity, steady one dimensional heat conduction with uniform internal heat generation, the plane slab, the cylindrical and spherical systems, heat transfer through fins of uniform cross-section, governing equation, temperature distribution and heat dissipation rate, effectiveness and efficiency of fins.

Transient conduction: Lumped system approximation and Biot number, approximate solution to unsteady conduction heat transfer by the use of Heisler charts.

UNIT-II

Convection: Heat convection, basic equations, boundary layers, forced convection, external and internal flows, natural convective heat transfer, dimensionless parameters for forced and free convection heat transfer, boundary layer analogies, correlations for forced and free convection, approximate solutions to laminar boundary layer equations (momentum and energy) for both internal and external flow, estimating heat transfer rates in laminar and turbulent flow situations using appropriate correlations for free and forced convection. Boiling and Condensation heat transfer, pool boiling curve, Nusselt theory of laminar film condensation.

UNIT-III

Radiation: Interaction of radiation with materials, definitions of radiative properties, monochromatic and total emissive power, Planck's distribution law, Stefan Boltzman's law, Wien's displacement law, Kirchoff's law, intensity of radiation, Lambert's cosine law, heat transfer between black surfaces, radiation shape factor, heat transfer between non-black surfaces: infinite parallel planes, infinite long concentric cylinders, small gray bodies and small body in large enclosure, electrical network approach, radiation shields.

UNIT-IV

Heat exchangers: Types of heat exchangers; overall heat transfer coefficient, fouling factor, analysis and design of heat exchangers using logarithmic mean temperature difference, and NTU method, effectiveness of heat exchangers, multipass heat exchangers, applications of heat exchangers.

Text books:

1. Fundamentals of Heat and Mass transfer – Frank P. Incropera, David P. Dewitt, T.L. Bergman and A.S. Lavine, Sixth Edition, Wiley Publications, 2007.
2. Heat Transfer: A Practical Approach - Yunus A Cengel, McGraw Hill, 2002.
3. Heat and Mass Transfer – P.K. Nag, Tata McGraw Hill.
4. Heat Transfer – J.P. Holman, Eighth Edition, McGraw Hill, 1997.

Reference books:

5. Heat Transfer – A. Bejan, John Wiley, 1993.
6. A Text book of Heat Transfer - S.P Sukhatme, University press.
7. Principles of Heat Transfer – Massoud Kaviany, John Wiley, 2002.
8. Heat and Mass Transfer - D.S Kumar, S.K. Kataria & Sons.
9. Heat Transfer – Y.V.C. Rao, University Press.

Note: The paper setter will set the paper as per the question paper template provided.

B. Tech (5th Semester) Mechanical Engineering							
MEC-303	**PRODUCTION TECHNOLOGY**						
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Total**	**Time (Hrs)**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3**
Purpose:	To acquaint the knowledge of different type of machines and machine tools used in machining of metals, cutting tools used in different operations, work holding devices and CNC machines.						
Course Outcomes							
CO 1	After completing the course, the students will be capable of knowing different machines, machine tools and the machining operations.						
CO 2	The students will be able to analyze the machining operations.						
CO 3	The students will have a knowledge of different types of cutting tools and cutting fluids used in machining.						
CO 4	The students will have understanding of metrology and inspection tools with their applications.						
CO 5	The students will know about various thread operations, use of different workholding devices and different gear manufacturing processes.						
CO 6	Students will know the advancements of CNC over conventional machining methods and other programing and tools related aspects related to CNC.						

UNIT-I

Theory of metal machining: Overview of machining technology: types of machining operation, cutting tools, cutting conditions, theory of chip formation in metal cutting: orthogonal cutting model, actual chip formation, forces relationships and the merchant equation: forces in metal cutting, the merchant equation, power and energy relationships in machining, cutting temperatures.

Machine tools and machining operations: Turning and related operations: cutting conditions, operations related to turning, engine lathe, other lathes and turning machines, boring machines, drilling and related operations: cutting conditions, operations related to drilling, drill presses, Milling: types of milling operations, cutting conditions, milling machines, high speed machining, grinding machines: types, wet and dry grinding, abrasives, grit, grade and structure of wheels, selection of grinding wheels.

UNIT-II

Technology and materials of cutting tools: Tool life, tool wear, taylor tool life equation, tool materials: high speed steels, cast cobalt alloys, cemented carbides, cermets and coated carbides, ceramics, synthetic diamonds and cubic boron nitrides, tool geometry: single point tool geometry, effect of tool material on tool geometry, multiple-cutting-edge tools, cutting fluids: types of cutting fluids, applications and selection of cutting fluids.

Metrology and inspection: Limits, fits, and tolerances, gauge design, interchangeability, linear, angular, and form measurements (straightness, squareness, flatness, roundness, and cylindricity) by mechanical and optical methods, inspection of screw threads, surface finish measurement by contact and non-contact methods, tolerance analysis in manufacturing and assembly.

UNIT-III

Threads: Standard forms of screw threads, methods of making threads, thread cutting on lathe, thread chasing, thread milling, thread rolling, thread grinding, thread tapping, automatic screw cutting machines, inspection and measurement of threads.

Workholding devices for machine tools: Introduction, conventional fixture design, tool design steps, clamping considerations, chip disposal, unloading and loading time, example of jig design, types of jigs, conventional fixtures, modular fixturing, setup and changeover: single-minute-exchange-of-die (SMED),

clamps, other workholding devices: assembly jigs, magnetic workholders, electrostatic workholders, economic justification of jigs and fixtures.

UNIT-IV

Gear manufacturing and finishing: Introduction to different types of gears, terminology, methods of gears manufacturing, gear forming: selecting a form gear cutter for cutting spur gears, selecting gear cutter for cutting helical or spiral gear, broaching of gears, generating methods: gear shaper process, rack planning process, gear hobbing process. Gear finishing operations: Shaving, burnishing, grinding, lapping, honing, gears inspection.

Computer numerical control (CNC) machines: Classification of CNC machines, modes of operation of CNC, Working of Machine Structure, Automatic tool changer (ATC), Automatic pallet changer (APC), CNC axis and motion nomenclature, CNC toolings – tool pre-setting, qualified tool, tool holders and inserts, Axes Identification in CNC turning and Machining centers, CNC part programming: Programming format and Structure of part programme, ISO G and M codes for turning and milling-meaning and applications of important codes.

Text Books:

1. Fundamentals of modern manufacturing: materials processing and systems by Mikell P. Grover, John Wiley and Sons.
2. Materials and processes in manufacturing by J.T. Black and R.A. Kohser, John Wiley and Sons.
3. Production Technology by R. K. Jain, Khanna Publishers.
4. Machine Tools by R. Kesavan & B. Vijaya Ramnath, Laxmi Publications.
5. Machining and Machine Tools by A. B. Chattopadhyay, WILEY INDIA.

Reference Books:

1. Principles of Machine Tools by G.C. Sen & A. Bhattacharya, Tata McGraw Hill, New Delhi
2. Manufacturing Engg. & Tech by S. KalpakJian and S.R. Schmid, Pearsons.
3. Modern Machining Processes by P.C. Pandey & H.S. Shan, T.M.H. Company, New Delhi
4. Production Engineering: P.C. Sharma, S.Chand & Sons.
5. Introduction to Jig and Tool Design by Kempster M.H.A, Hodder & Stoughton, England

Note: The paper setter will set the paper as per the question paper template provided.

B. Tech. (5th Semester) Mechanical Engineering							
MEC-305	**MECHANICAL VIBRATIONS AND TRIBOLOGY**						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total Time**	**Time (Hrs)**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3**
Purpose:	To understand the vibration systems with different degrees of freedom in different modes and conditions and the basics of tribology.						
Course Outcomes							
CO1	The students will be capable of understanding the vibration fundamentals for a single degree of freedom (D.O.F.) system under free and damped vibrations.						
CO2	The students will be able to analyze different types of forced vibration system in single degree of freedom (D.O.F.) and damped, undamped, free and forced systems with two D.O.F.						
CO3	The students will understand the principal modes of vibrations using different methods for various combinations of spring-mass and rotor-shaft systems and to study transverse, longitudinal and torsional vibration for beams, bars and shafts respectively.						
CO4	The students will understand the fundamentals of tribology, lubrication, friction and wear.						

UNIT-I

Fundamentals: Introduction, elements of a vibratory system, periodic and S.H.M., degrees of freedom (DOF), types of vibrations, work done by a harmonic force, beats, problems.

Free vibration systems with single degree of freedom

Undamped systems: Introduction, differential equations, torsional vibrations, spring and shaft combinations: series & parallel, linear and torsional systems, compound pendulum, bifilar and trifilar suspensions, problems.

Damped systems: Introduction, types of damping, differential equations of damped free vibrations, initial conditions, logarithmic decrement, vibrational energy, problems.

UNIT-II

Forced vibration systems with single degree of freedom: Introduction, excitation and sources, equations of motion, rotating and reciprocating unbalanced system, support motion, vibration isolation, force and motion transmissibility, forced vibration system with different types of damping, vibration measuring instruments, resonance, bandwidth, quality factor and half power points, critical speed of shaft with and without damping with single and multiple discs, problems.

Two degree of freedom system: Introduction, torsional vibrations, principal modes of vibrations for two D.O.F., damped and undamped forced and free vibrations, semi-definite systems, co-ordinate coupling, spring and mass type vibration absorber, problems.

UNIT-III

Multi-degree of freedom systems: Introduction, principal modes of vibrations for three or more DOF, influence coefficients, orthogonality principle, matrix method, matrix iteration method, Dunkerley's equation, Holzer's Method, Rayleigh Method, Rayleigh-Ritz method, Stodola method, problems.

Continuous systems: Introduction, lateral vibrations of strings, longitudinal vibrations of bars, transverse vibration of beams, torsional vibration of uniform shafts, problems.

UNIT-IV

Tribology: Introduction, tribology in design, tribology in industry, economic aspects.

Lubrication: Introduction, basic modes of lubrication, lubricants, properties of lubricants: physical and chemical, types of additives, extreme pressure lubricants, recycling of used oils and oil conservation, disposal of scrap oil, oil emulsion.

Friction and wear: Introduction, laws of friction, kinds of friction, causes of friction, friction measurement, theories of friction, effect of surface preparation. Introduction to wear, types of wear, various factors affecting wear, measurement of wear, wear between solids and liquids, theories of wear.

Text Books:

1. Mechanical Vibrations by G. K. Grover, Nem Chand and Bros., Roorkee
2. Elements of Mechanical Vibrations by Meirovitch, McGraw Hill
3. Introductory course on theory and practice of Mechanical Vibration by J.S. Rao and K.Gupta, New Age International.
4. Friction and wear of Materials by E. Robinowicz, Johan Wiley
5. Tribology an Introduction by Sushil Kumar Srivastava
6. Introduction to Tribology and Bearings by B. C. Majumdar, S. Chand and Company Ltd. New Delhi.

Reference Books:

1. Mechanical Vibrations by S. S. Rao, Pearson Education Inc. Dorling Kindersley (India) Pvt. Ltd. New Delhi.
2. Mechanical Vibrations by V.P. Singh, Dhanpat Rai & Co. Pvt. Ltd., Delhi
3. Engineering Tribology by Prashant Sahoo, PHI publications.
4. Principles of Tribology by J. Hailing, McMillan Press Ltd.

Note: The paper setter will set the paper as per the question paper template provided.

B. Tech. (5th Semester) Mechanical Engineering								
MEC- 307L	**HEAT TRANSFER LAB**							
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs)**
0	**0**	**2**	**1**	**0**	**40**	**60**	**100**	**3**
Purpose	To impart practical knowledge of different modes of heat transfer by conducting experiments.							
Course Outcomes								
CO1	Design and conduct experiments, acquire data, analyze and interpret data.							
CO2	Measure the thermal conductivity of metal rod, insulating material and liquids etc.							
CO3	Understand the concept of composite wall and determine its thermal resistance.							
CO4	Measure heat transfer coefficients in free and forced convection.							
CO5	Measure the performance of a heat exchanger.							
CO6	Determine the Stefan Bolzman constant and emissivity.							

List of Experiments:

1. To determine the thermal conductivity of a metal rod.
2. To determine the thermal conductivity of an insulating slab.
3. To determine the thermal conductivity of a liquid using Guard plate method.
4. To determine the thermal conductivity of an insulating powder.
5. To determine the thermal resistance of a composite wall.
6. To plot the temperature distribution of a pin fin in free-convection.
7. To plot the temperature distribution of a pin fin in forced-convection.
8. To study the forced convection heat transfer from a cylindrical surface.
9. To determine the effectiveness of a concentric tube heat exchanger in a parallel flow arrangement.
10. To determine the effectiveness of a concentric tube heat exchanger in a counter flow arrangement.
11. To determine the Stefan-Boltzman constant.
12. To determine the emissivity of a given plate.
13. To determine the critical heat flux of a given wire.
14. To study the performance of an evacuated tube based solar water heater.

Note: At least eight experiments are required to be performed by students from the above list and two may be performed from the experiments developed by the institute.

B. Tech. (5th Semester) Mechanical Engineering								
MEC-309L	**PRODUCTION TECHNOLOGY LAB**							
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
0	**0**	**2**	**1**	**0**	**40**	**60**	**100**	**3**
Purpose	To impart practical knowledge of various measuring instruments, machining and welding operations by performing experiments.							
Course Outcomes								
CO 1	The students will be able to gain the practical knowledge of different measuring instruments used in machining operations.							
CO 1	The students will be able to perform different machining operations for the preparation of a job piece.							
CO 2	The students will be able to prepare various jobs using TIG/MIG welding.							
CO 3	The students will be trained for manufacturing the job pieces on CNC lathe and CNC milling.							

LIST OF EXPERIMENTS:

1. Study of linear, angular measuring devices and to measure the linear and angular dimensions using various equipment's.
2. Manufacture and assembly of a unit consisting of 2 to 3 components to have the concept of tolerances and fits (shaft and bush assembly or shaft, key and bush assembly or any suitable assembly).
3. To prepare a job on a lathe having various operations viz. drilling, boring, taper turning, thread cutting, knurling, etc.
4. Demonstration of formation of cutting parameters of single point cutting tool using bench grinder / tool & cutter grinder.
5. To make a spur gear of given part drawing involving operations namely drilling, boring, reaming, honing, key slotting, gear teeth machining, lapping and gear teeth finishing.
6. Introduction to various grinding wheels and demonstration on the cylindrical and surface grinder.
7. To demonstrate surface milling /slot milling.
8. To cut gear teeth on milling machine using dividing head.
9. To cut V Groove/ dovetail / Rectangular groove using a shaper.
10. To prepare a useful product containing different types of welded joints using simple arc/TIG/MIG welding set.
11. To cut external threads on a lathe and practice thread measurements.
12. To study CNC lathe trainer and its components (hardware and software) especially controllers (Fanuc and Siemens) and make a CNC programme using APT language of given part drawing for machining cylindrical job involving operations namely turning, step turning, taper turning, threading, radius contour cutting, chamfering etc.
13. To study CNC milling trainer and its components (hardware and software) especially controllers (Fanuc and Siemens) and make a CNC programme using APT language of given drawing for milling job operations namely end cutting, side cutting, contour cutting, face cutting, etc. and

run the programme in simulation and actual mode in Cut Viewer or other software and run the program in actual mode using CNC controllers.

.**Note:** At least eight experiments are required to be performed by students from the above list and two may be performed from the experiments developed by the institute.

B. Tech. (5th Semester) Mechanical Engineering								
MEC-311L	**MECHANICAL VIBRATIONS AND TRIBOLOGY LAB**							
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Practical**	**Total Time**	**Time (Hrs.)**
0	**0**	**2**	**1**	**0**	**40**	**60**	**100**	**3**
Purpose:	To provide practical knowledge of free and forced vibration system fundamentals and the mechanisms of friction, wear and lubrication.							
Course Outcomes								
CO1	The students will be able to know practically the concepts of free and forced vibrations for a spring mass system and will determine the natural frequency.							
CO2	The students will be able to diagnose the machinery faults, there causes and sources using Machinery Fault Simulator (MFS).							
CO3	The students will understand the concept of sliding wear and abrasive wear using wear and friction monitoring apparatus and dry abrasion tester respectively.							
CO4	The students will be capable of measuring the extreme pressure properties of different lubricants using four ball tester.							

LIST OF EXPERIMENTS:

1. To study undamped free vibrations and determine the natural frequency of:
   1.1 Spring mass system
   1.2 Simple Pendulum
   1.3 Torsional spring type double pendulum and compare them with theoretical values.
2. To study the torsional vibration of a single rotor shaft system and determine the natural frequency.
3. To study the free vibration of system for different damper settings. Draw decay curve and determine the log decrement and damping factor. Find also the natural frequency.
4. To verify the Dunkerley's rule.
5. To determine the radius of gyration for:
   5.1 Bifilar suspension.
   5.2 Compound pendulum.
   5.3 Trifilar suspension.
6. To study the forced vibration system with damping, Load magnification factor vs. Frequency and phase angle vs frequency curves. Also determine the damping factor.
7. To find out and locate machinery faults viz. vibrations and unbalancing using Machinery Fault Simulator (MFS) in:
   7.1 Direct Driven reciprocating pump;
   7.2 Direct Driven centrifugal pump;
   7.3 Defective straight tooth gearbox pinions.
8. To determine the wear rate, friction force and coefficient of friction of a metallic pin/ball by using wear and friction monitor apparatus.
9. To determine abrasion index of a material with the help of dry abrasion test rig.
10. To evaluate the wear and extreme pressure properties of a lubricating oil by using four ball tester.
11. To determine the roughness of a specimen using surface roughness tester.

Note: At least eight experiments are required to be performed by students from the above list and two may be performed from the experiments developed by the institute.

B. Tech. (5th Semester) Mechanical Engineering								
MEC-313 L	**PROJECT-I**							
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Practical**	**Total Time**	**Time (Hrs.)**
0	**0**	**2**	**1**	**--**	**0**	**100**	**100**	**3**
Purpose:	To implement the engineering principles and theories into innovative practical projects for solving real world problems.							
Course Outcomes								
CO1	The students will be able to apply the theoretical knowledge into practical work.							
CO2	The students will be able to learn new things related to latest technologies with the help of practical work.							

The project work could be done for the problem statement of an industry or practical project in the institute. The students may also opt for the analysis based software projects with proper validation. Participation in any technical event/ competition to fabricate and demonstrate an innovative machine or product could be encouraged under this course.

Note: The maximum number of students in a group should not exceed four.

	B. Tech. (5th Semester) Mechanical Engineering							
MEC-315	**INDUSTRIAL TRAINING-II**							
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
2	**0**	**0**	**--**	**--**	**100**	**--**	**100**	**--**
Purpose	To provide an industrial exposure to the students and enhance their skills and creative capability for conversion of their innovative ideas into physical reality.							
Course Outcomes								
CO 1	The students could be capable of self-improvement through continuous professional development and life-long learning.							
CO 2	The students will be aware about the social, cultural, global and environmental responsibility as an engineer.							
CO 3	The students will be up-to-date with all the latest changes in technological world.							

Note: MEC-315 is a mandatory non-credit course in which the students will be evaluated for the industrial training undergone after 4th semester and students will be required to get passing marks to qualify.

The candidate has to submit a training report of his/her work/project/assignment completed in the industry during the training period. The evaluation will be made on the basis of submitted training report and viva-voce/presentation.

	B. Tech. (5th Semester) Mechanical Engineering							
MC-903	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**							
Lecture	**Tutorial**	**Practical**	**Credits**	**Major Test**	**Minor Test**	**Practical**	**Total**	**Time (Hrs.)**
3	**0**	**0**	**--**	**100**	**--**	**--**	**100**	**3**
Purpose	To impart basic principles of thought process, reasoning and inferencing.							
Course Outcomes								
CO 1	The students will be able to understand, connect up and explain basics of Indian traditional knowledge in modern scientific perspective.							

Course Contents

- Basic structure of Indian Knowledge System: अष्टादशविद्या -४वेद,४उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) ६वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाङ्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies

References

- V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
- Swami Jitatmanand, *Modern Physics and Vedant*, Bharatiya Vidya Bhavan
- Swami Jitatmanand, *Holistic Science and Vedant*, Bharatiya Vidya Bhavan
- Fritzof Capra, *Tao of Physics*
- Fritzof Capra, *The Wave of life*
- VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad, Arnakulam
- *Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata
- GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, Vidyanidhi Prakashan, Delhi 2016
- RN Jha, *Science of Consciousness Psychotherapyand Yoga Practices*, Vidyanidhi Prakashan, Delhi 2016
- P B Sharma (English translation), *Shodashang Hridayan*

Pedagogy: Problem based learning, group discussions, collaborative mini projects.

Note: The paper setter will set the paper as per the question paper template provided.