SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)

SYLLABUS

For

Bachelor of Technology (B.Tech)
Course Code: BTME

Department of Mechanical Engineering
Faculty of Engineering

Duration of Course : 4 Year
Examination Mode : Semester

Examination System : Grading

Swami Vivekanand University, Sironja Sagar (M.P.)
2014-2015

Swami Vivekanand University, Sagar(M.P.)

Mathematics - I (BTME-0101)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0101	Mathematics - I	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I **Marks :16**

MATRICES Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties of eigen values – Caley – Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT – II **Marks :16**

DIFFERENTIAL CALCULUS Curvature – Cartesian and polar coordinates – Circle of curvature – Involutes and Evolutes – Envelopes – Properties of envelopes.

UNIT – III **Marks :16**

FUNCTIONS OF SEVERAL VARIABLES Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangean Multiplier method – Jacobians

UNIT – IV **Marks :16**

ORDINARY DIFFERENTIAL EQUATIONS Simultaneous first order linear equations with constant coefficients – Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form

UNIT – V **Marks :16**

THREE DIMENSIONAL ANALYTICAL GEOMETRY Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

Text Books

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition.,
2. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan," Engineering Mathematics" – Vol I & II Anuradha Publications, Revised Edition 2006.
3. Veerajan, T., Engineering Mathematics, Tata McGraw Hill Publishing Co., New Delhi,2000.

Reference Books

1. Kreyszig.E, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons. Singapore,2001.
2. Kandasamy P etal. "Engineering Mathematics", Vol.I (4th revised edition), S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., "Advanced Mathematics for Engineering students", Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.

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Fundamentals of Physics (BTME-0102)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0102	Fundamentals of Physics	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I **Marks :16**

WAVE OPTICS-I Interference- definition, types, explanation of interference, Interference by division of wave front: Fresnel's biprism, fringe width, Interference in thin films Wedge shaped films, Interference by division of amplitude: Newton's rings, Michelson's Interferometer and its applications.

UNIT – II **Marks :16**

WAVE OPTICS-II Diffraction :- Introduction - Differences between Fresnel and Fraunhofer diffractions Single slit diffraction (Qualitative and quantitative treatment) – Differences between interference and diffraction, resolving power of optical instruments (prism and gratting). Polarization:- Introduction – double refraction –Negative crystals & Positive crystals - Nicol's prism – Quarter wave plate and half wave plate – Production and detection of circularly and elliptically polarised light.

UNIT – III **Marks :16**

QUANTUM PHYSICS De Broglie's hypothesis, De Broglie's wave length, Davisson and Germer's experiment, Compton Effect, concept of wave packet & their properties, wave function & probability interpretation, Heisenberg's Uncertainty Principle, its elementary proof and applications, energy and momentum operators, time dependent and time independent Schrödinger wave equation. Application of time independent Schrödinger wave equation to particle trapped in a one dimensional square potential well.

UNIT – IV **Marks :16**

NUCLEAR PHYSICS

General properties of nucleus, Nuclear model (liquid drop model and shell model), accelerator, linear particle accelerator, cyclotron, general betatron, Counters and particle detectors Geiger-Muller Counter, nuclear fission, nuclear fusion, nuclear reaction, nuclear reactors.

UNIT – V **Marks :16**

LASER AND FIBER OPTICS

Laser: Stimulated and spontaneous processes, main part of laser, laser action population inversion, pumping, Optical resonators, characteristics of laser beam, Principles and working of Ruby, Nd:YAG, He-Ne & with energy level diagram and Applications of lasers Fiber Optics - Fundamental idea about optical fiber, types of fibers,acceptance angle & cone, numerical aperture, V-number, propagation of light through step index fiber (Ray theory) pulse dispersion, attenuation, losses, various uses, and application of optical fibers.

Text Books

1. Gaur and Gupta "Engineering Physics"
2. Tiwari and Navneet Gupta "Engineering Physics"
3. Vikram Yadav "Engineering Physics"

Reference Books

1. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Jenkins and White: "Optics", McGraw-Hill Book Company.
4. Sanjeev Puri: Modern Physics, Narosa Pub.Co. 2004.
5. Kaplan: Nuclear Physics, Narosa Publishing, 1987.
6. Tyagrajan and Ghatak: Lasers, Macmillan, 2001.

List of Experiments

1. Keiser: G Optical fiber Communication, McGraw-Hill, 2000.
2. Fresenal Biprism,
3. Newton's Rings,
4. Michelsons Interferometer.
5. Resolving Powers –Telescope,
6. Spectrometers-R.I., Wavelength, using prism and grating
7. Optical polarization based experiments: Brewster’s angle, polarimeter etc.
8. Measurements of wavelength of LASER
9. To study the CRO.
10. Charging and discharging of capacitor
11. Other conceptual experiments related to theory syllabus

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Chemistry (BTME-0103)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0103	Chemistry	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I **Marks :16**

TECHNOLOGY OF WATER

Source of water, Impurities in water, Analysis of water- Hardness of water, Estimation of Hardness, Alkalinity of water, Determination of alkalinity, Disadvantages of using hard water in boiler- sludge and scale formation, Boiler corrosion, Water softening techniques (Internal and External treatment), treatment of water for domestic purposes.

UNIT – II **Marks :16**

CORROSION AND ITS CONTROL

Corrosion: Basic concept- Principles, Mechanism of Dry or Chemical Corrosion and Wet or Electrochemical Corrosion, Pilling Bedworth rule, Types of corrosion- Galvanic corrosion, Concentration cell corrosion, Pitting corrosion, Stress corrosion, Microbiological corrosion, Factors influencing corrosion, Corrosion control.

UNIT – III **Marks :16**

A. FUELS

Definition & Classification of fuels, Calorific values, Analysis of coal, Carbonization of coal, Manufacturing of coke & recovery of by products.Cracking, Knocking, Anti-knocking, Octane & Cetane number, Gaseous fuels.

B. LUBRICANTS

Introduction, functions & classification of lubricants, Mechanism of lubrication, Properties and Testing of lubricants.

UNIT – IV **Marks :16**

POLYMER

Introduction and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization, Mechanism of addition polymerization -Free radical and Ionic polymerization, Ziegler Natta polymerization, Vulcanization of rubbers, Preparation, Properties and Applications of important polymers- Polyethylene, PVC, PMMA, Nylons, Terylene, Glyptal, Bakelite, Urea-formaldehyde, Silicone resin, Neoprene, Buna S, Buna N.

UNIT – V **Marks :16**

INSTRUMENTATIONAL METHODS OF CHEMICAL ANALYSIS

Introduction to Spectroscopy, Electromagnetic spectrum, Introduction, Principle, Instrumentation and Application of IR, UV- Visible, NMR, Basic Principle and Instrumentation of Potentiometry, Flame photometry and Chromatography.

Text Books

1. Jain.P.C and Monika Jain, Engineering Chemistry, Danpat Raj publishing company (P) Ltd, New Delhi – 2002.
2. Dara.S.S, Text book of Engineering Chemistry, S. Chand & Company Ltd, New Delhi
3. Sharma B.K., "Instrumental methods of chemical analysis" 24th Edition Krishna Prakashan Media Pvt. Ltd, Meerut, 2005.

Reference Books

1. Kuriacose J.C. and Rajaram J. Chemistry in Engineering and Technology, Volume II, Tata McGraw Hill p.b. Co., 1988.
2. Jeyalakshmi.R & Ramar. P, Engineering Chemistry, 1st Edition, Devi Publications, Chennai 2006.
3. Rattan S., Text book of Engineering Chemistry, S.K. Kataria and Sons, Publication, 1st Edition, New Delhi, 2012

List of Experiments

1. Preparation of standard solutions.
2. Conductometric titration-determination of strength of an acid.
3. Determination of alkalinity, hydroxyl, carbonate and bicarbonate in water.
4. Determination of total hardness in water using EDTA titrations.
5. Estimation of iron by potentiometer.
6. Estimation of Copper in Ore
7. Determination of viscosity of lubricating oil with change of temperature by
    a. Red Wood Viscometer Number 1
    b. Red Wood Viscometer Number 2
8. Determination of Flash and Fire point of liquid fuel and lubricants by
    a. Cleaveland's Open Cup Method
    b. Abel's Flash Point Apparatus
    c. Pensky Martin's Flash Point Apparatus.
9. Determination of Cloud and Pour point of lubricants by Cloud and Pour point Apparatus.
10. Determination of carbon residue of lubricants by Conradson's Apparatus.

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REFERENCE BOOKS FOR PRACTICAL

1. Chemistry department manual, Edition, 2008.
2. Chawla S., Theory and Practicals of Engineering Chemistry, Dhanpat Rai & Co. (Pvt.) Ltd. 6th Edition, New Delhi – 2011.

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Basic Engg.- I (BTME-0104)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min		(d) =	Max	Min		(h) =	(i) =	
						(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(d+h)	
BTME-0104	Basic Engg.-I	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I **Marks :16**

AC & DC CIRCUITS

Circuit parameters, Ohms law, Kirchhoff's law. Average and RMS values, concept of phasor representation, RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits) Introduction to three phase systems – types of connections, relationship between line and phase values.

UNIT – II **Marks :16**

MAGNETIC CIRCUITS

Definition of mmf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship. Problems involving simple magnetic circuits. Faraday's laws, induced emfs and inductances, brief idea on Hysteresis and eddy currents.

UNIT – III **Marks :16**

ELECTRICAL MACHINES

Working principle, construction and applications of DC machines and AC machines (single phase transformers, single phase induction motors – split phase, capacitor start and capacitor start & run motors).

UNIT – IV **Marks :16**

DIGITAL ELECTRONICS

– Number system, Boolean Theorems, DeMorgan's Theorem, Logic gates, Implementation of Boolean expression using logic gates, Half adder, Full adder. Electronic Components – Resistors, Inductors and Capacitors and their types. CRO.

UNIT – V **Marks :16**

SEMICONDUCTOR – Energy band diagram, Intrinsic and Extrinsic semi conductors, PN Junction diode, Zener diode and their V-I characteristics , Zener diode used as a Voltage regulator, Light emitting diode and Photo diode. Rectifier – Half wave and full wave Rectifier and their efficiency and ripple factor, Filters.

Text Books

1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
2. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition.
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. Mehta V.K., Principals of Electronics, S. Chand & Co.
6. Moris Mano, Digital Electronics, PHI Pub.
7. Kalsi H.s. , Electronics Instrumentation, ISTE Pub.

Reference Books

1. Kothari D. P and Nagrath IJ, Basic Electrical Engineering, Tata McGraw- Hill, 1991.
2. Thomas L.Floyd Electronic devices, Addison Wesley Longman (Singapore) Pvt . Ltd., 5th Edition.
3. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
4. Mehta V.K., Principals of Electronics, S. Chand & Co.

List of Experiments

1. Study of KVL and KCL.
2. Study of Transformer, name plate rating, determination of rayio and polarity.
3. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
4. Identification and testing of different Electronics components.
5. Observing input and output waveforms of rectifiers.
6. Verification of truth table for various gates.
7. To study the V-I characteristics of PN diode and Zener Diode.
8. To implement basic logic gate by using universal gate(NAND & NOR).
9. Measurement of frequency and time period of a signal using CRO.

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Computer Lab (BTME-0105)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min		(d) =	Max	Min		(h) =	(i) =	
						(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(d+h)	
BTME-0105	Computer Lab	-	-	2	2	-	-	-	-	-	-	50	50	50	

PURPOSE

This Lab Course will enable the students to understand the basics of computer and to know the basics of MSOffice.

INSTRUCTIONAL OBJECTIVES

1. To learn the basics of computer, Computer Peripherals and its application in real world.
2. Demonstration on Ms-Word, Ms-Excel, Ms-Power Point and Ms-Access

Text Books

1. Introduction to Information Technology ITL Education Solutions Ltd., Pearson 2nd Edition, 2006.

List of Experiments

1. Study experiment on evolution of computer programming languages.
2. Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice.
3. Experiments to demonstrate directory creation and file creation.
4. Create a document with all formatting effects.
5. Create a document with tables.
6. Create labels in MS word.
7. Create a document to send mails using mail merge option.
8. Create an Excel File to analyze the student's performance. Create a chart for the above data to depict it diagrammatically.
9. Create Excel sheet to use built-in-function like sum, count, countif ,if, etc.
10. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
11. Create a Power Point presentation for your personal profile with varying animation effects with timer.
12. Consider student information system which stores student personal data, mark information and non-academic details.
    * Use MS Access to create Tables and execute SQL queries to do this following
    * Display all student records.
    * Display student details with respect to his identity.
    * Delete some records from the table.
    * Find total marks obtained by student in each list.

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Workshop Practice (BTME-0106)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0106	Workshop Practice	-	-	2	2	-	-	-	-	50	15	50	100	100	

PURPOSE

To provide the students with hands on experience on different trades of engineering like fitting, carpentary, smithy, welding and sheet metal.

INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

Text Books

1. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, practice and work book, Suma Publications, 2005.

Reference Books

1. Kannaiah,P. & Narayanan,K.C. Manual on Workshop Practice, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. , First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

List of Experiments

1. EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.
2. FITTING
   Tools & Equipments – Practice in Filing and Drilling.
   Making Vee Joints, Square, dovetail joints, Key Making.
3. CARPENTARY
   Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.
4. SHEET METAL
   Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.
5. WELDING
   Tools and equipments - Arc welding of butt joint, Lap Joint, Tee Fillet.
   Demonstration of Gas welding, TIG & MIG.
6. SMITHY
   Tools and Equipments –Making simple parts like hexagonal headed bolt, chisel.

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English (BTME-0107)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0107	English	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I **Marks :16**

LANGUAGES AND SKILLS OF COMMUNICATION

Linguistic Techniques, Reading Comprehension, Phonetic symbols/signs, Oral Presentation, Process of communication, Verbal and non-verbal Communication, Barriers of communication.

UNIT – II **Marks :16**

APPLICATION OF LINGUISTIC ABILITY

Definitions of Engineering terms, objects, processes & principles ,Paragraph Writing on topics of General Interest, Importance of Listening Skills, Unseen Passage, Conversational Dialogues

UNIT – III **Marks :16**

LETTER WRITING

Applications, Enquiry & Complaint letters, Calling & Sending quotations, Placing orders, Tenders.

UNIT – IV **Marks :16**

PRECISE WRITING

Slogan – Writing, Technical Description of Simple engineering objects & processes, Note – making.

UNIT – V **Marks :16**

REPORT WRITING

Observation Report, Survey Report, Report of Trouble, Laboratory Report, Project Report, Telephonic Etiquettes, Debate, Speech.

Text Books

1. Abraham Benjamin Samuel Practical Communication Communicative English LSRW2000 – SRMEC –June 2006 Revised Edition.
2. Staff of the Department of Humanities and Social Science, Anna University, “English for Engineers /Technologist Vol.-I”. Orient Longman, 1990.

Reference Books

1. Herbert. A. J. The structure of Technical English Orient Longman 1995.
2. Pickett and Laster, ‘Technical English, Writing, Reading and Speaking’, New York Harper and Row Publications, 1997.
3. Interactive course in phonetics and spoken English published by Acoustics Engineers (ACEN) 2002.

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Project - I (BTME-0108)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0108	Project - I	-	-	4	4	-	-	-	-	-	-	50	50	50	

The objectives of the course 'Project work' are

1. To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
2. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
3. To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.
4. To adapt students for latest developments and to handle independently new situations.
5. To develop good expressions power and presentation abilities in students.

The faculty and student should work according to following schedule:

i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.
ii) The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty
iii) At all the steps of the project, students must submit a written report of the same.

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Mathematics - II (BTME-0201)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0201	Mathematics - II	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I **Marks :16**

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

UNIT – II **Marks :16**

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform.

UNIT – III **Marks :16**

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method.

UNIT – IV **Marks :16**

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation. Separation of variable method for the solution of wave and heat equations.

UNIT – V **Marks :16**

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem.

Text Books

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition., Veerajan, T., Engineering

Reference Books

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Higher Engineering Mathematics by BS Grewal, Khanna Publication
3. Advance Engineering Mathematics by D.G.Guffy

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Material Physics (BTME-0202)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0202	Material Physics	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I **Marks :16**

STRUCTURE OF MATERIALS

Type of solids, Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Brages law X-ray diffraction for crystal structure.

UNIT – II **Marks :16**

SEMICONDUCTING MATERIALS

Introduction, intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, carrier concentration in n type semiconductors, carrier concentration in p-type semiconductors, Hall effect and its applications - variation of carrier concentration with temperature, conductivity of extrinsic semiconductor, P-N junction – forward bias – reverse bias –V-I characteristics of a p-n junction. Basic introduction of transistors.

UNIT – III **Marks :16**

DIELECTRIC MATERIALS

Introduction, Fundamental definitions, Local field, Clausius- Mossotti relation, different types of electric polarization (dipolar, ionic and electronic polarizations), frequency and temperature effects on polarization, dielectric loss, dielectric breakdown, determination of dielectric constant, properties and different types of insulating materials, ferroelectric materials, spontaneous polarization in BaTiO3, electrets.

UNIT – IV **Marks :16**

MAGNETIC & SUPERCONDUCTING MATERIALS

MAGNETIC MATERIALS Concept of magnetism- Dia, para, ferro magnetic materials · Hysteresis loop· Soft and hard magnetic material· magnetic Storages application of magnetic materials

SUPERCONDUCTING MATERIALS Introduction – basic theories for superconductivity Meissner effect - Properties of superconductors - Type-I and Type-II superconductors – High Tc superconductors – application.

UNIT – V **Marks :16**

NANO MATERIALS

Introduction to nano science, nano materials synthesis of nono materials (using different routes) properties of nano materials, carbon nano tubes, application of nano materials.

Text Books

1. Gaur and Gupta "Engineering Physics"
2. Tiwari and Navneet Gupta "Engineering Physics"
3. Vikram Yadav "Engineering Physics"
4. Materials Science'. By Dr. M. Arumugam.

Reference Books

1. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Azroff: Solid State Physics, Tata McGraw-Hill, 2004.
4. Materials Science'. By Dr. M. Arumugam.
5. Science of Engg. Materials and Carbon Nano tubes- C. M. Shrivastava and C. Srinivasan

List of Experiments

1. Uses of Potentiometers and Bridges (Electrical)
2. Experiments connected with diodes
3. Experiments connected with transistor.
4. Measurement of energy band gap of semiconductor.
5. To study Hall effect.
6. To study Solar cell.
7. To study the LED
8. Other conceptual experiments related to theory syllabus.

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Energy & Environment Science (BTME-0203)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0203	Energy & Environment Science	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I **Marks :16**

ENERGY

Energy, Energy scenario in world and India, Sources of energy, Renewable and nonrenewable sources of energy, Advantages and disadvantages of different sources of energy- Fossil fuel, Coal, Oil, Gas, Nuclear, Solar, Wind, Geothermal, Hydel, Hydrogen and Ocean energy.

UNIT – II **Marks :16**

ENVIRONMENT AND ECOSYSTEM

Ecology and ecosystem, Structure and types of an ecosystem, Food chain and food web, segment of Environment-Atmosphere, Hydrosphere, Lithosphere, Biosphere, Cycles in ecosystem-Gaseous, Sedimentary and Water.

UNIT – III **Marks :16**

ENVIRONMENTAL POLLUTION-I

Introduction, Air Pollution, Lapse Rate and Inversion Temperature, Air Pollutants, Classification of Air Pollutants, Causes of air pollution, Adverse effect of air pollution, Acid rain, Global warming, Chemical & photochemical smog and Ozone layer depletion, Control of Air Pollution.

UNIT – IV **Marks :16**

ENVIRONMENTAL POLLUTION-II

Water Pollution, Classification of water pollutants, Characteristics of waste water, Waste water treatment- Primary, Secondary and Tertiary, Eutrophication, Soil or
and Pollution, Radioactive Pollution, Noise Pollution

UNIT – V **Marks :16**

ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

Solid waste management, Treatment and disposal methods, important environmental protection act in India- water, air (prevention and control of pollution) act, Wild life
conservation and forest act, Functions of central and state pollution control boards, Environmental impact assessment.

Text Books

1. Sharma.B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994.
2. De A.K., Environmental Chemistry, New Age International Pvt. Ltd., New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, Essential of Environmental Studies, Pearson Education, 2004.

Reference Books

1. Dara S.S., A Text Book of Environmental Chemistry and pollution contro, S.Chand & Company Ltd., New Delhi, 2004.
2. Jeyalakshmi.R, Principles of Environmental Science, 1st Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari.M, Environmental Science – Challenges and Changes, 1st Edition,Sudhandhira Publications, 2007.

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Basic Engg.- II (BTME-0204)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min		(d) =	Max	Min		(h) =	(i) =	
						(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(d+h)	
BTME-0204	Basic Engg.- II	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I **Marks :16**

Building Materials & Construction Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

UNIT – II **Marks :16**

Surveying & Positioning:

Introduction to surveying Instruments – levels, thedolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

UNIT – III **Marks :16**

Engineering Mechanics

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non concurrent Co- planner forces, free Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems. Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia.

UNIT – IV **Marks :16**

Measurement

Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainly analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lath, drilling, milling and shaping machines.

UNIT – V **Marks :16**

Reciprocating Machines

Thermodynamics: First and second law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol & diesel IC engines.

Text Books

1. Raju K.V.B., Ravichandran P.T., Basics of Civil Engineering, Ayyappa Publications, Chennai, 2000.
2. Ramesh Babu, Civil Engineering, VRB Publishers, Chennai, 2000.
3. Kumar, T., Leenus Jesu Martin., and Murali, G., Basic Mechanical Engineering, Suma Publications, Chennai, 2007.
4. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.

Reference Books

1. Rangwala,S.C., Engineering Materials, Charotar Publishing House, Anand,
2. National Building Code of India, Part V, Building Materials, 2005
3. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi
4. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.
5. Palanichamy, M.S., Basic Civil & Mechanical Engineering, Tata McGraw-Hill , New Delhi 1991.
6. Nagpal G. R., Power Plant Engineering, Khanna Publisher, Delhi,2004

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Computer Science (BTME-0205)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min		(d) =	Max	Min		(h) =	(i) =	
						(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(d+h)	
BTME-0205	Computer Science	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I **Marks :16**

PROGRAMMING FUNDAMENTALS

Computer Basics; Program Development Life Cycle: Flow Chart, Algorithm, Compilation and Execution; Introduction to C Language: program structure, variables, keywords, data types; Input / Output functions: scanf, printf; simple programs.

UNIT – II **Marks :16**

DECISION AND LOOP CONTROL STRUCTURE

Logical operators; Decision statements: if/else, switch/case statements; Loop control statements – for, while, do/while.

UNIT – III **Marks :16**

ARRAYS AND FUNCTIONS

Arrays: Introduction to arrays; One dimensional array: declaration, reading and printing array elements, sorting and searching. Functions: Definition; declaration of functions; return statement;recursion.

UNIT – IV **Marks :16**

INTRODUCTION TO OOP CONCEPTS

OOP concepts: classes and objects, encapsulation, inheritance, overloading, polymorphism, constructor and destructor, data hiding,simple program in C++.

UNIT – V **Marks :16**

INHERITANCE AND OVERLOADING

Inheritance – single, multiple, multilevel; Overloading – Function overloading, Operator overloading.

Text Books

1. Kanetkar P.Yashwant, “Let us C”, BPB publications, 2002.
2. Ashok N.Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, 2006.
3. Herbert Schildt, “The Complete Reference C++”, TataMcGrawHill, 2001, 3rd Edition.
4. Robert Lafore, “Object Oriented Programming in Microsoft C++”, The Waite Group, Galgotia Publications Pvt. Ltd., 2002.

Reference Books:-

1. Robert Lafore, "Object Oriented Programming in Microsoft C++", The Waite Group, Galgotia Publications Pvt. Ltd., 2002.

List of Experiments:-

Note to the Instructors: Design exercise problems to demonstrate the use of C and C++ in the area of specialization.

1. Programs to demonstrate the use of scanf( ) and printf( ) functions
2. Programs to evaluate arithmetic expressions
3. Pprograms using conditional statements
4. Programs using for,while , do…while
5. Programs on arrays
6. Programs to perform matrix addition and multiplication
7. Programs to implement functions
8. Programs to illustrate recursion
9. Program to create classes and objects using C++
10. Program to implement Constructor and Destructor in C++
11. Program to implement single inheritance in C++
12. Program to implement Function overloading in C++
13. Program to implement Operator overloading in C++

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Engg. Graphics Lab (BTME-0206)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0206	Engg. Graphics Lab	-	-	2	2	-	-	-	-	50	15	50	100	100	

UNIT – I **Marks :16**

FUNDAMENTALS OF ENGINEERING GRAPHICS

Lettering, two dimensional geometrical constructions, conics, representation of three-dimensional objects – principles of projections – standard codes – projection of points.

UNIT – II **Marks :16**

PROJECTION OF LINES AND SOLIDS

Projection of straight lines, projection of solids – auxiliary projections

UNIT – III **Marks :16**

SECTIONS AND DEVELOPMENTS

Sections of solids and development of surfaces.

UNIT – IV **Marks :16**

PICTORIAL PROJECTIONS

Conversion of projections: Orthographic projection, isometric projection of regular solids & combination of solids.

UNIT – V **Marks :16**

BUILDING DRAWING

Building Drawing – plan, elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

Text Books

1. Jeyapoovan, T., Engineering Drawing and Graphics using AutoCAD 2000, Vikas Publishing house Pvt Ltd, NewDelhi, 2005.
2. Narayanan, K.L & Kannaiah, P., Engineering Graphics, Scitech Publications, Chennai, 1999.

Reference Books

1. Bhatt, N.D., Elementary Engineering Drawing (First Angle Projection), Charotar Publishing Co., Anand, 1999.
2. Venugopal, K. Engineering Drawing & Graphics, New Age international Pvt. Ltd., 2001.
3. Natarajan, K.V. Engineering Drawing & Graphics, Private Publication, Chennai, 1990.

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Seminar/GD/Lang. Lab (BTME-0207)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0207	Seminar/GD/Lang. Lab	-	-	2	2	-	-	-	-	-	-	50	50	50	

UNIT – I **Marks :16**

Topics to be covered in the Language Lab Sessions:
Introduction session: Introduce oneself, Family background, Educational qualification, Hobbies and interest, Expertise, Experience (If any), Strength and weaknesses.

UNIT – II **Marks :16**

Body language: Importance of body language, Dressing sense, Walking sense, Talking and communication, Dining and eating sense.

UNIT – III **Marks :16**

Telephonic etiquettes: How to receive calls, How to respond, How to make a call, Common expressions for calling.
PPTs presentations:
Improving speaking skills: Speech practices, Role plays (on stage), GD and Debate, Extempore speech, Word games, JAM (Just a minute) session, Describing objects and situations.

UNIT – IV **Marks :16**

Reading skills: Improving reading skills, Paragraph reading, Storytelling and reading, Audio and video sessions.

UNIT – V **Marks :16**

Writing skills: Paragraph writing, Word power/ vocabulary building, Article writing, Translations from Hindi to English and vice-versa.
Presentation skills: Oral presentations, on all the learning sessions. Seminar on given topics.

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Project work-II (BTME-0208)

Course Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max (a)	Min (b)	(c)	(d) = (a+c)	Max (e)	Min (f)	(g)	(h) = (e+f)	(i) = (d+h)	
BTME-0208	Project work-II	-	-	4	4	-	-	-	-	-	-	50	50	50	

The objectives of the course 'Project work' are

1. To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.

2. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.

3. To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.

4. To adapt students for latest developments and to handle independently new situations.

5. To develop good expressions power and presentation abilities in students.

The faculty and student should work according to following schedule:

i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.

ii) The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

iii) At all the steps of the project, students must submit a written report of the same.

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MATHEMATICS-III (BTME-0301)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0301	MATHEMATICS-III	3	1	0	4	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I **Marks : 16**

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals.

UNIT- II **Marks : 16**

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

UNIT- III **Marks : 16**

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

UNIT- IV **Marks : 16**

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

UNIT- V **Marks : 16**

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution ,Testing of Hypothesis |:Students t-test, Fisher's z-test, Chi-Square Method

Text Books:-

1.Engineering Mathematics by B.S.Grewal .

Reference Books:-

1. Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
2.Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
3. Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication
4. Numerical Methods using Matlab by Yang,Wiley India
5. Pobability and Statistics by Ravichandran ,Wiley India

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PRODUCTION PROCESS (BTME-0302)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0302	PRODUCTION PROCESS	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **Marks : 16**

Metrology: Standards of Measurements, Linear and angular instruments; slip gauges, comparators, sine bar, angle gauges, clinometers, tape gauge, screw thread measurements limit gauging, Gauge design; fits and tolerance. Rolling: General description of machines and process; Rolling of structural sections plates and sheets; construction of halls; hot and cold rolling techniques.

UNIT- II **Marks : 16**

Metal cutting : Principles of metal cutting, tool geometry ,Tool life plots , Mach inability, Tool wear, Cutting force analysis ,Cutting tool materials & Cutting fluids ,Economics of metal machining.

UNIT- III **Marks : 16**

Pattern Making: Pattern and pattern making, pattern allowances; pattern design considerate ons, core, core boxes, types of patterns. Foundry: molding and core sands and their properties molding machines, centrifugal casting, dye casting shell molding; cupola description and operation. Lost wax molding; continuous casting.

UNIT- IV **Marks : 16**

Forging: Theory and application of forging processes description; principle of toleration of drop and horizontal forging machines; General principle of designs. Press working: Description and operation of processes, process of shearing, punching, piercing, blanking, trimming, perfecting, notching, lancing, embossing, coining, bending, forging and drawing press, tool dies, auxiliary equipment, safety devices, stock feeders, scrap cutters, forces, pressure and power requirements, requirements of stock material.

UNIT- V **Marks : 16**

Welding: Gas welding, Electric arc welding, A.C. and D.C. welding machines and their characteristics. Flux, Electrodes, Pressure welding, electric resistance welding spot, seam and built welding, submerged arc welding; thermit and TIG & MIG Welding, Brazing Gas cutting Spinning: Introduction of spinning.

Text Books :-
Hajra Choudhary; Workshop Technology;

Reference Books:-

1.Anderson and Tetro; Shop Theory;TMH
2. Kaushik JP; Manufacturing Processes; PHI
3. Bawa; Manufacturing Processes; TMH
4. Rao PN; Manufacturing Tech- Foundry, forming welding; TMH
5. Rao PN; Manufacturing Tech- Metal cutting and machine tools; TMH
6. Chapman; Workshop Technology :
7. Begeman; Manufacturing Process : John Wiley
8. Raghuvanshi; Workshop Technology :; Dhanpat Rai.
9. Ravi B; Metal Casting- CAD analysis; PHI.
10. Hajra Choudhary; Workshop Technology:, Vol I
11. Pandya & Singh;Production Engineering Science:.

List of Experiments:-

1. Linear and angular instruments

2. sine bar, angle gauges, clinometers, tape gauge, screw thread measurements

3. Pattern and pattern making

4. Gas welding, Electric arc welding

5.TIG & MIG Welding

6. Cutting tool materials & Cutting fluids

Text Books:-

1 BHOOPENDRA GUPTA

2.P.N.RAO

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STRENGTH OF MATERIAL (BTME-0303)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0303	STRENGH OF MATERIAL	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT I **Marks : 16**

Mechanical properties of materials: Ductility, malleability, hardness, toughness, fatigue, creep; behavior of materials under tension, compression, bending, shear; ductile and brittle materials, failure of MS andCI in tension and torsion Stress and strain: stresses in members of a structure, axial loading, normal stress, shear stress, bearing stress, analysis of simple structures, stepped rods, members in series and parallel: stress strain diagram, Hooke's law, modulus of elasticity, elastic and plastic behavior of materials, deformation under axial loading, statically indeterminate problems, stress due to temperature, Poisson's ratio, Bulk modulus, shearstrain, relation among elastic constants, residual stress, fiber reinforced composite materials, strain energy under axial loads and stresses due to impact of falling weights.

UNIT II **Marks : 16**

Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and its application to two and three dimensional analysis, ductile and brittle failures, transmission shaft under combined bending and torsion; stresses in thin walled pressure vessel

UNIT III **Marks : 16**

Bending: pure bending, symmetric member, deformation and stress, bending of composite sections, eccentric axial loading, shear force and BM diagram, relationship among load, shear and BM, shear stresses in beams, strain energy in bending, deflection of beams, equation of elastic curve, Macaulay's method and Area moment method for deflection of beams.

UNIT IV **Marks : 16**

Torsion in shafts: stresses in a shaft, deformation in circular shaft, angle of twist, stepped-hollow, thin walled-hollow transmission shafts Leaf springs; helical springs, open and closed coil, stress in spring wire, deflection of helical spring, springs in series and parallel.

UNIT V **Marks : 16**

Theories of failures: maximum normal stress & shear stress theory; maximum normal and shear strain energy theory; maximum distortion energy theory; application of theories to different materials and loading conditions Columns: stability of structures, Euler's formula for columns with different endconditions, Rankin's formula.

References:

1. Beer FP, Johnson ER, Dewolf JT : Mechanics of Materials; TMH
2. Rattan; Strength of materials; TMH
3. Nash William; Schaum's Outline Series; Strength of Materials; TMH.
4. Negi ; strength of materials; TMH
5. Singh Arbind K; Mechanics of Solids; PHI
6. Sadhu Singh; Strength of Materials; Khanna Pub.
7. Kamal K and Ghai RC; Advanced Mechanics of Materials; Khanna Pub.

List of experiments (Pl. expand it):

1. Standard tensile test on MS and CI test specimen
2. Direct/ cross Shear test on MS and CI specimen
3. Transverse bending test on wooden beams to obtain modulus of rupture
4. Fatigue test
5. Brinell Hardness tests
6. Vicker hardness test

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THERMAL ENGG-I (Thermodynamics) (BTME-0304)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0304	THERMAL ENGG-I (Thermodynamics)	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

Unit I **Marks : 16**

Basic concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, statement and significance, concept of an Ideal gas, Gas laws, Avogadro's hypothesis, Heat and work transfer. First law of thermodynamics- Statement of first law of thermodynamics, first law applied to closed system, first law applied to a closed system undergoing a cycle, processes analysis of closed system, flow process, flow energy, steady flow process, Relations for flow processes, limitations of first law of thermodynamics.

Unit II **Marks : 16**

Second law of thermodynamics, heat engine, heat reservoir, Refrigerator, heat pump, COP, EPR, Available energy, Carnot's theorem, Carnot's cycle, efficiency of Carnot's cycle, statement of second law Reversible and irreversible processes, consequence of second law, Entropy, Entropy change for ideal gas, T-S diagrams, Availability and Irreversibility. Gibbs and Helmholtz functions

Unit III **Marks : 16**

Real gas, Deviation with ideal gas, Vander-wall's equation, evaluation of its constants, limitations of the equation. The law of corresponding states Compressibility factor, Generalized compressibility chart, P-V-T surface of a Real gas, Thermodynamics relations, Maxwell relations and there applications.

Unit IV **Marks : 16**

Pure Substance, Phase, Phase-transformations, formation of steam, properties of steam, PVT surface, HS,TS,PV,PH,TV diagram, processes of vapor measurement of dryness fraction, Use of steam table and Mollier chart.

Unit V **Marks : 16**

Air standard cycles, Carnot, Otto, Diesel, Dual cycles and there comparison, two stroke and four stroke engines, Brayton cycle, non reactive gas mixture, PVT relationship, mixture of ideal gases, properties of mixture of ideal gases, internal energy, Enthalpy and specific heat of gas mixtures, Enthalpy of gasmixtures.

References:-

1. P.K.Nag; Engineering Thermodynamics; TMH
2. Van GJ; Thermodynamics; John Wylen
3. Cengel Y; Thermodynamics; TMH
4. Arora CP; Thermodynamics; TMH
5. Thermal Engineering by R Yadav
6. Engineering Thermodynamics by Omkar Singh New Age International.
7. Engineering Thermodynamics by Ratha Krishanan PHI India Pvt. Ltd.
8. Engineering Thermodynamics by M. Achuthan, PHI India.

List of Experiments (Pl. expand it):

1. To find mechanical equivqlent of heat using Joules apparatus
2. To study working of impulse and reaction steam turbine by models.\
3. To study working of Gas turbines by models and to identify various processes of Brayton Cycle.
4. To calculate COP of vapour compression refrigeration system and to plot on T-s, p-H diagrams.
5. To plot specific fuel consumstion versus rpm diagrams for diesel and petrol engines

Theory classes must be supplemented with laboratory classes.

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Machine Drawing & Design (BTME-0305)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0305	Machine Drawing & design	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT I: **Marks : 16**

Drawing conventions; drawing and dimensioning IS codes, sectional views and sectioning, surface finishand tolerances, representation of machine parts such as external and internal threads, slotted heads, squareends, and flat radial ribs, slotted shaft, splined shafts, bearings, springs, gears. Rivet heads and Rivetedjoints, types of welded joints and representation.

UNIT II **Marks : 16**

Assembly Machine Drawing: Basic concept, plotting technique, assembly and blow up of parts, bill ofmaterials, product data; Cotter and Knuckle joints, pedestal and footstep bearings, crosshead, stuffingbox, IC engines parts - piston and connecting rods; lath machine parts.

UNIT III **Marks : 16**

Introduction to Compute Aided Drafting software for 2D and 3D Modeling, Basic designconcepts, design process, stages/phases in design, flowchart, problem formulation, designconsiderations (strength, manufacturing, maintenance, environment, economics and safety); design forrecycle and reuse, Design and safety factors for steady and variable loads, impact and fatigueconsiderations, reliability and optimization, standardization in design..

UNIT IV **Marks : 16**

Design of components subject to static loads: riveted joints, welded joints threaded joints, pin, key knuckle, and cotter joints.

References:-

1. Bhat, ND; Machine Drawing; Charotar
2. Singh A; Machine Drawing; TMH
3. Narayana and Reddy; Machine Drawing; New age, Delhi.
4. Agarwal and agrawal; Engineering Drawing; TMH
5. Shigley JE et al; Mechanical Engineering Design, TMH
6. John KC; Text Book Of Machine Drawing; PHI Learning
7. Kulkarni SG; Machine Design; TMH
8. Mubeen and Mubeen; Machine Design.
9. Bhandari VB; Design of Machine elements; TMH
10. Sharma PC, Agarwal DK; Machine Design; Katson
11. Luzzader WJ, Duff JM; Fundamental of Engg Drawing Interactive Graphics; PHI.
12. PSG Design data book
13. Mahadevan and Reddy's Mechanical design data book

List of Experiments (Pl. expand it):
1. Computer Aided Drafting of simple machine parts
2 3D modeling of simple solid shapes
3 Design and drawing of parts contained in the syllabus

Text Books

1.R.S.KHURMI

2.MAHADEVAN DESIGN DATA BOOK

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Seminar /GD (BTME-0306)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0306	Seminar /GD	-	-	2	2	0	0	0	0	0	0	-	50	50	3 Hrs

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Project Work III (BTME-0307)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0307	Project Work III	-	-	4	4	0	0	0	0	0	0	-	50	50	3 Hrs

Swami Vivekanand University, Sagar(M.P.)

RENEWABLE ENERGY SOURCES
(BTME-0401)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0401	Renewable Energy System	3	1	0	4	80	25	20	100	0	0	0	0	100	3 Hrs

UNIT- I **Marks : 16**

Solar Radiation: Extra-terrestrial and terrestrial, radiation measuring instrument,radiation measurement and predictions. Solar thermal conversion: Basics, Flat platecollectors-liquid and air type. Theory of flat plate collectors, selective coating, advancedcollectors, Concentrators: optical design of concentrators, solar water heater, solar dryers, solarstills, solar cooling and refrigeration.Solar photovoltaic: Principle of photovoltaic conversion of solar energy; Technology forfabrication of photovoltaic devices; Applications of solar cells in PV generation systems; Organic PV cells.

UNIT- II **Marks : 16**

Wind energy characteristics and measurement: Metrology of wind speed distribution,wind speed statistics, Weibull, Rayleigh and Normal distribution, Measurement of wind data,Energy estimation of wind regimes; Wind Energy Conversion: Wind energy conversionprinciples; General introduction; Types and classification of WECS; Power, torque and speedcharacteristics; power curve of wind turbine, capacity factor, matching wind turbine with windregimes; Application of wind energy.

UNIT- III **Marks : 16**

Production of biomass, photosynthesis-C3 & C4 plants on biomass production;Biomass resources assessment; Co2 fixation potential of biomass; Classification of biomass;Physicochemical characteristics of biomass as fuel Biomass conversion routes: biochemical,chemical and thermo chemical Biochemical conversion of biomass to energy: anaerobicdigestion, biogas production mechanism, technology, types of digesters, design of biogas plants, installation, operation and maintenance of biogas plants, biogas plant manure-utilizationand manure values. Biomass Gasification: Different types, power generation from gasification,cost benefit analysis of power generation by gasification

UNIT- IV **Marks : 16**

Small Hydropower Systems: Overview of micro, mini and small hydro system;hydrology; Elements of turbine; Assessment of hydro power; selection and design criteria ofturbines; site selection and civil works; speed and voltage regulation; Investment issue loadmanagement and tariff collection; Distribution and marketing issues. Ocean Energy: Oceanenergy resources, ocean energy routs; Principle of ocean thermal energy conversion system,ocean thermal power plants. Principles of ocean wave energy and Tidal energy conversion.

UNIT- V **Marks : 16**

Geothermal energy: Origin of geothermal resources, type of geothermal energydeposits, site selection geothermal power plants; Hydrogen Energy: Hydrogen as a source ofenergy, Hydrogen production and storage. Fuel Cells: Types of fuel cell, fuel cell system andsub-system, Principle of working, basic thermodynamics

References:-

1. Kothari, Singal & Rajan; Renewable Energy Sources and Emerging Technologies, PHI Learn
2. Khan, B H, Non Conventional Energy, TMH.
3. Sukhatme and Nayak, Solar Energy, Principles of Thermal Collection and Storage, TMH.
4. Tiwari and Ghosal, Renewable Energy Resources: basic principle & application, Narosa Publ
5. Koteswara Rao, Energy Resources, Conventional & Non-Conventional, BSP Publication.
6. Chetan Singh Solanki, Solar Photovoltaics: Fundamental, technologies and Application,PHI L
7. Abbasi Tanseem and Abbasi SA; Renewable Energy Sources; PHI Learning
8. Ravindranath NH and Hall DO, Biomass, Energy and Environment, Oxford University Press.
9. Duffie and Beckman, Solar Engineering of Thermal Process, Wiley
10. Nikolai, Khartchenko; Green Power; Tech Book International
11. Tester, Sustainable Energy-Choosing Among Options, PHI Learning.

Swami Vivekanand University, Sagar(M.P.)

MATERIAL SCIENCE & METALLURGY (BTME-0402)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0402	MATERIAL SCIENCE & METALLURGY	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I: **MARKS-16**

Crystal Atoms of Solid: Structure of atom binding in solids metallic, Vander walls, ionic andcovalent, Space lattice and crystal system arrangement of atoms in BCC, FCC and HCP crystal.Manufacture of Refractory and Ferrous Metals: Properties uses and selection of acid, basic andnatural refractory, metallurgical coke, Properties, types, uses and brief description of themanufacturing processes for iron and steel making.

UNIT- II: **MARKS-16**

Plastic deformation of Metals: Point and line defects in crystals, their relation to mechanicalproperties, deformation of metal by slip and twinning stress strain curves of poly crystallinematerials viz. mild steel cast iron and brass yield point phenomenon. Cold and hot working ofmetals and their effect on mechanical properties, annealing of cold worked metals, principles ofre-crystallization and grain growth phenomenon, fracture in metal and alloys, ductile and brittleracture, fatigue failure

UNIT-II I: **MARKS-16**

Alloy Formation and Binary Diagram: Phase in metal system solution and inter-metalliccompounds. Hume- Rottery's rules, solidification of pure metals and alloy equilibrium diagramsof isomorphous, eutectic peritectic and eutectoid system, non-equilibrium cooling and coringiron, iron carbon equilibrium diagram

UNIT- IV **MARKS-16**

Heat Treatment of Alloys Principles of Heat Treatment of Steel: TTT curves heat treatingprocesses, normalizing, annealing spherodizing, hardening, tempering, case hardening, austempering,mar-tempering, precipitation hardening process with reference to Al, Cu alloyshydraulic intensifier, accumulator, press and crane.

UNIT- V: **MARKS-16**

Properties of Material: Creep Fatigue etc., Introduction to cast iron and steel, Non Ferrousmetals base alloys, Bronze, Brasses, Duralumin, and Bearing Metals. Plastics, Composites andceramics: Various types of plastics, their properties and selection. Plastic molding technology,FRP, GRP resins adhesive, elastomers and their application. Powder Metallurgy: Property andApplications of Powder Metallurgy, Various process and methods of making products by powderMetallurgy techniques.

References:-

1. Venkanna BK; turbomachinery; PHI
2. Shepherd DG; Turbo machinery
3. Csanady; Turbo machines
4. Kadambi V Manohar Prasad; An introduction to EC Vol. III-Turbo machinery; Wiley Eastern Delhi
5. Bansal R. K; Fluid Mechanics & Fluid Machines;
6. Rogers Cohen & Sarvan Multo Gas Turbine Theory
7. Kearton W. J; Steam Turbine: Theory & Practice

Swami Vivekanand University, Sagar(M.P.)

Theory of Machine
(BTME-0403)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0403	THEORY OF MACHINE	3	1	2	6	80	25	20	100	50		50	100	200	3 Hrs

UNIT- I: **MARKS-16**

Mechanisms and Machines: Mechanism, machine, plane and space mechanisms, kinematicpairs, kinematic chains and their classification, degrees of freedom, Grubler's criterion,kinematic inversions of four bar mechanism and slider crank mechanism, equivalent linkages,pantograph, straight line motion mechanisms, Davis and Ackermann's steering mechanisms,Hooke's joint.

UNIT-I I: **MARKS-16**

Kinematic analysis of plane mechanisms using graphical and Cartesian vector notations: Planarkinematics of a rigid body, rigid body motion, translation, rotation about a fixed axis, absolutegeneral plane motion. General case of plane motion, relative velocity method, velocity andacceleration analysis, instantaneous center and its application, Kennedy's theorem, relativemotion, Coriolis component of acceleration; velocity and acceleration analysis using complexalgebra (Raven's) method.

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UNIT- III: **MARKS-16**

Gears: Classification of gears, nomenclature, involutes and cycloidal tooth profileproperties, synthesis of tooth profile for spur gears, tooth system, conjugate action, velocity ofsliding, arc of contact, path of contact, contact ratio, interference and undercutting, helical,spiral, bevel and worm gears.

UNIT- IV: **MARKS-16**

Cams: Classification of followers and cams, radial cam nomenclature, analysis of followermotion (uniform, modified uniform, simple harmonic, parabolic, cycloidal), pressure angle, radiusof curvature, synthesis of cam profile by graphical approach, cams with specified contours.Gear Trains: Simple, compound, epicyclic gear trains; determination of gear speeds usingvector, analytical and tabular method; torque calculations in simple, compound and epicyclic gear trains

UNIT- V: **MARKS-16**

Gyroscopic Action in Machines: angular velocity and acceleration, gyroscopic torque/ couple;gyroscopic effect on naval ships; stability of two and four wheel vehicles, rigid disc at an anglefixed to a rotating shaft

References:

1. Rattan SS; Theory of machines; TMH
2. Ambekar AG; Mechanism and Machine Theory; PHI.
3. Sharma CS; Purohit K; Theory of Mechanism and Machines; PHI.
4. Thomas Bevan; Theory of Machines; Pearson/ CBS PUB Delhi.
5. Rao JS and Dukkipati; Mechanism and Machine Theory; NewAge Delhi.
6. Dr.Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi –
7. Ghosh,A,.Mallik,AK; Theory of Mechanisms & Machines, 2e,; Affiliated East West Press, Delhi.

List of experiments (expandable)

1. To study all inversions of four-bar mechanisms using models
2. Draw velocity and acceleration polygons of all moving link joints in slider crank mechanism
3. Determination of velocity and acceleration in above using method of graphical differentiation Grading IVth Semester w.e.f.2011-12
4. To study working of differential gear mechanism.
5. To study working of sun and planet epicycle gear train mechanism using models
6. To plot fall and rise of the follower versus angular displacement of cam and vice versa.
7. Study of universal gyroscope
8. Analytical determination of velocity and acceleration in simple mechanism using Roven's M. Grading IVth Semester w.e.f.2011-12

Swami Vivekanand University, Sagar(M.P.)

Thermal Engg and Gas Dynamics (BTME-0404)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0404	Thermal Engg and gas dynamics	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **MARKS-16**

Steam generators: classification, conventional boilers, high-pressure boilers-lamont, benson,loeffler and velox steam generators, performance and rating of boilers, equivalent evaporation, boilerefficiency, heat balance sheet, combustion in boilers, super critical boilers, fuel and ash handling,boiler draught, overview of boiler codes.

UNIT- II **MARKS-16**

Phase Change Cycles: Vapor Carnot cycle and its limitation, Rankin cycle, effect of boiler andCondenser pressure and superheat on end moisture and efficiency of ranking cycle, modified Rankincycle, reheat cycle, perfect regenerative cycle, Ideal and actual regenerative cycle with single andmultiple heaters, open and closed type of feed water heaters, regenerative-reheat cycle, supercriticalpressure and binary-vapor cycle, work done and efficiency calculations.

UNIT- III **MARKS-16**

(A) Gas dynamics: speed of sound, in a fluid mach number, mach cone, stagnationproperties, one-dimensional isentropic flow of ideal gases through variable area duct-mach numbervariation, area ratio as a function of mach number, mass flow rate and critical pressure ratio, effectof friction, velocity coefficient, coefficient of discharge, diffusers, normal shock.(b) Steam nozzles: isentropic flow of vapors, flow of steam through nozzles, condition for maximumdischarge, effect of friction, super-saturated flow

UNIT- IV **MARKS-16**

Air compressors: working of reciprocating compressor, work input for single stagecompression different, compression processes, effect of clearance, volumetric efficiency realindicator diagram, isentropic & isothermal and mechanical efficiency, multi stage compression, inter -cooling, condition for minimum work done, classification and working of rotary compressors.

U NIT- V **MARKS-1 6**

Steam condensers, cooling towers and heat exchangers: introduction, types of condensers,back pressure and its effect on plant performance air leakage and its effect on performance ofcondensers, various types of cooling towers, design of cooling towers, classification of heatexchangers, recuperates and regenerators .parallel flow, counter flow and cross flow exchangers,fouling factor, introduction to LMTD approach to design a heat exchanger.

References:

1. Nag PK; Power plant Engineering; TMH
2. Thermodynamics by Gordon J. Van Wylen
3. P.K.Nag; Basic and applied Thermodynamics; TMH
4. Ganesan; Gas turbines; TMH
5. Heat Engines by V.P. Vasandani & D. S. Kumar
6. R. Yadav Steam and Gas Turbines
7. R.Yadav Thermal Engg.
8. Kadambi & Manohar; An Introduction to Energy Conversion – Vol II. Energy conversion cycles

List of Experiments (Please Expand it) (Thermal Engg and gas dynamics):

1. Study of working of some of the high pressure boilers like Lamont or Benson
2. Study of Induced draft/forced and balanced draft by chimney
3. Determination of Calorific value of a fuel
4. Study of different types of steam turbines
5. Determination of efficiencies of condenser
6. Boiler trail to chalk out heat balance sheet
7. Determination of thermal efficiency of steam power plant
8. Determination of Airflow in ducts and pipes.
9. To find out efficiencies of a reciprocating air compressor and study of multistage Compressors .
10. Find Out heat transfer area of a parallel flow/counter flow heat exchanger

Swami Vivekanand University, Sagar(M.P.)

Fluid Mechanics (BTME-0405)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0405	FLUID MECHANICS	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **MARKS-16**

Review of Fluid Properties: Engineering units of measurement, mass, density, specificweight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity,pressure and vapor pressure. FluidStatic's : Pressure at a point, pressure variation in staticfluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces(Problems on gravity dams and Tainter gates); buoyant force, Stability of floating andsubmerged bodies, Relative equilibrium.

.

UNIT- II **MARKS-16**

Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & nonuniform,one, two and three dimensional flow, path lines, streak-lines, streamlines and streamtubes; continuity equation for one and three dimensional flow, rotational & irrotational flow,circulation, stagnation point, separation of flow, sources & sinks, velocity potential, streamfunction, flow netstheir utility & method of drawing flow nets.

UNIT-II I **MARKS-16**

Dynamics of Flow: Euler's equation of motion along a streamline and derivation ofBernoulli's equation, application of Bernoulli's equation, energy correction factor, linearmomentum equation for steady flow; momentum correction factor. The moment of momentumequation, forces on fixed and moving vanes and other applications. Fluid Measurements:Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement(orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-meter, weirs and notches).

.

UNIT- IV **MARKS-16**

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensionalhomogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similaritylaws, specific model investigations (submerged bodies, partially submerged bodies, weirs,spillways, rotodynamic machines etc.)

UNIT- V **MARKS-16**

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynoldsnumber, relation between shear & pressure gradient, laminar flow through circular pipes,laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubricationprinciples.

References: -

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi

2. Streeter VL, Wylie EB, Bedford KW; Fluid Mechanics; TMH

3. Som and Biswas; Fluid Mechnics and machinery; TMH

4. Cengal; Fluid Mechanics; TMH

5. White ; Fluid Mechanics ; TMH

6. Gupta; Fluid Mechanics; Pearson

7. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt. (ANSTI)

8. R Mohanty; Fluid Mechanics; PHI

List of Experiments (Pl. expand it):-

1. To determine the local point pressure with the help of pitot tube.

2. To find out the terminal velocity of a spherical body in water.

3. Calibration of Orifice meter and Venturi meter

4. Determination of Cc, Cv, Cd of Orifices

5. Calibration of Nozzle meter and Mouth Piece

6. Reynolds experiment for demonstration of stream lines & turbulent flow

7. Determination of meta-centric height

Grading IVth Semester w.e.f.2011-12

8. Determination of Friction Factor of a pipe

9. To study the characteristics of a centrifugal pump.

10. Verification of Impulse momentum principle.

Swami Vivekanand University, Sagar(M.P.)

Seminar /GD (BTME-0406)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0406	Seminar /GD	-	-	2	2	0	0	0	0	0	0	-	50	50	3 Hrs

Swami Vivekanand University, Sagar(M.P.)

Project Work IV (BTME-0407)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0407	Project Work IV	-	-	4	4	0	0	0	0	0	0	-	50	50	3 Hrs

Swami Vivekanand University, Sagar(M.P.)

ENTERPRENEARSHIP &MANAGEMENT CONCEPT (BTME-0501)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0501	ENTERPRENEARSHIP & MANAGEMENT CONCEPT	3	1	0	4	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I **Marks : 16**

System Concepts: Types, definition & characteristics; supra & subsystems, keycomponent; boundary & interface complexity; feedback (pull) & feed forward (push) controls,open flexible-adaptive system, computer as closed system, law of requisite variety; systemcoupling, stresses and entropy; functional & cross functional system; Steven Alter's nineelement work system model and its comparison with IPO (input-processing-output) model,structure and performance of work systems leading to customer delight.

UNIT- II **Marks : 16**

Management: Importance, definition and functions; schools of theories, knowledgedriven learning organization and e-business; environment, uncertainty and adaptability;corporate culture, difficulties and levels of planning, BCG matrix, SWOT analysis, steps indecision making, structured and unstructured decision; dimensions of organizations,size/specialization, behavior formalization, authority centralization, departmentalization, spamand line of control, technology and Minzberg organization typology, line, staff & matrixorganization, coordination by task force, business process reengineering and process of changemanagement, HR planning placement and training, MIS; attitudes and personality trait, overlapand differences between leader & manager, leadership grid, motivation, Maslow's needhierarchy and Herzberg two factor theory, expectation theory, learning process, team work andstress management.

UNIT- III **Marks : 16**

Marketing: Importance, definition, core concepts of need want and demand, exchange& relationships, product value, cost and satisfaction (goods and services) marketingenvironment; selling, marketing and societal marketing concepts; four P's, product, price,placement, promotion; consumer, business and industrial market, market targeting, advertising,publicity, CRM and market research **Finance:** Nature and scope, forms of business ownerships, balance sheet, profit and lossaccount, fund flow and cash flow statements, breakeven point (BEP) and financial ratio analysis,pay-back period, NPV and capital budgeting.

UNIT- IV **Marks : 16**

Productivity and Operations: Productivity, standard of living and happiness, types ofproductivity, operations (goods and services) Vs project management, production processesand layouts, steps in method improvement, time measurement, rating and various allowances;standard time and its utility, predetermined motion and time method, product and processspecification, TQM, cost of quality, introduction to lean manufacturing (JIT), QFD, TPM & sixsigma quality.

Swami Vivekanand University, Sagar(M.P.)

UNIT- V **Marks : 16**

Entrepreneurship : Definition and concepts, characteristics, comparison with manager,classification, theories of entrepreneur, socio, economic, cultural and psychological;entrepreneur traits and behavior, roles in economic growth, employment, social stability, exportpromotion and indigenization, creating a venture, opportunity analysis competitive and technicalfactors, sources of funds, entrepreneur development program

References:-

1- Daft R; The new era of management; Cengage.
2- Bhat Anil, Arya kumar; Management: Principles ,Processes and Practices; Oxford higher edu.
3- Davis & Olson; Management Information System; TMH.
4- Steven Alter; Information systems, Pearson, www.stevenalter.com
5- Kotler P; Marketing management;
6- Khan, Jain; Financial Management;
7- ILO; Work study; ILO.
8- Mohanty SK; Fundamental of Entrepreneurship; PHI.

Swami Vivekanand University, Sagar(M.P.)

Turbo Machinery (BTME-0502)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0502	Turbo Machinery	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **MARKS-16**

Energy transfer in turbo machines: application of first and second laws of thermodynamics to turbo machines, moment of momentum equation and Euler turbine equation, principles of impulse and reaction machines, degree of reaction, energy equation for relative velocities, one dimensional analysis only.

UNIT-I I **MARKS-16**

Steam turbines: impulse staging, velocity and pressure compounding, utilization factor, analysis for optimum U.F Curtis stage, and Rateau stage, include qualitative analysis, effect of blade and nozzle losses on vane efficiency, stage efficiency, analysis for optimum efficiency, mass flow and blade height. **Reactions staging**: Parson's stages, degree of reaction, nozzle efficiency, velocity coefficient, stator efficiency, carry over efficiency, stage efficiency, vane efficiency, conditions for optimum efficiency, speed ratio, axial thrust, reheat factor in turbines, problem of radial equilibrium, free and forced vortex types of flow, flow with constant reaction, governing and performance characteristics of steam turbines.

UNIT-III **MARKS-16**

Water turbines: Classification, Pelton, Francis and Kaplan turbines, vector diagrams and work-done, draft tubes, governing of water turbines. **Centrifugal Pumps**: classification, advantage over reciprocating type, definition of mano-metric head, gross head, static head, vector diagram and work done. **Performance and characteristics**: Application of dimensional analysis and similarity to water turbines and centrifugal pumps, unit and specific quantities, selection of machines, Hydraulic, volumetric, mechanical and overall efficiencies, Main and operating characteristics of the machines, cavitations.

UNIT- IV **MARKS-16**

Rotary Fans, Blowers and Compressors: Classification based on pressure rise, centrifugal and axial flow machines. **Centrifugal Blowers** Vane shape, velocity triangle, degree of reactions, slip coefficient, size and speed of machine, vane shape and stresses, efficiency, characteristics, fan laws and characteristics. **Centrifugal Compressor** – Vector diagrams, work done, temp and pressure ratio, slip factor, work input factor, pressure coefficient, Dimensions of inlet eye, impeller and diffuser. **Axial flow Compressors**- Vector diagrams, work done factor, temp and pressure ratio, degree of reaction, Dimensional Analysis, Characteristics, surging, Polytrophic and isentropic efficiencies.

UNIT- V **MARKS-16**

Power Transmitting turbo machines: Application and general theory, their torque ratio, speed ratio, slip and efficiency, velocity diagrams, fluid coupling and Torque converter, characteristics, **Positive displacement machines** and turbo machines, their distinction. Positive displacement pumps with fixed and variable displacements, **Hydrostatic systems** hydraulic intensifier, accumulator, press and crane.

References:-

1. Venkanna BK; turbomachinery; PHI
2. Shepherd DG; Turbo machinery
3. Csanady; Turbo machines
4. Kadambi V Manohar Prasad; An introduction to EC Vol. III-Turbo machinery; Wiley Eastern Delhi
5. Bansal R. K; Fluid Mechanics & Fluid Machines;
6. Rogers Cohen & Sarvan Multo Gas Turbine Theory
7. Kearton W. J; Steam Turbine: Theory & Practice

Swami Vivekanand University, Sagar(M.P.)

Mechanical Measurement & Control (BTME-0503)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0503	Mechanical Measurement & control	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **MARKS-16**

Basic Concepts of Measurement: General measurement system; Experimental test plan:variables, parameters, noise and interference, replication and repetition; Calibration: Staticcalibration, dynamic calibration, static sensitivity, range, accuracy, precision and bias errors,sequential and random tests; Presenting data: Rectangular coordinate format, semi-log, full-logformats. Measurement System Behavior: General model for a dynamic measurement systemand its special cases: zero order, first order, and second order system, determination of timeconstant and settling time, phase linearity.

UNIT-II **MARKS-16**

Statistics: Least square regression analysis and data outlier detection; Normaldistribution and concept of standard deviation of the mean in finite data set, UncertaintyAnalysis: Measurement errors; error sources: calibration, data acquisition, data reduction;Design stage uncertainty analysis; combining elemental errors; Bias & Precision errors; Errorpropagation, Higher order uncertainty analysis.

UNIT- III **MARKS-16**

Temperature Measurement: Temperature standards, Temperature scales;Thermometry based on thermal expansion: Liquid in glass thermometers, BimetallicThermometers; Electrical resistance thermometry: Resistance Temperature Detectors,Thermistors; Thermoelectric Temperature Measurement: Temperature measurement withthermocouples, thermocouple standards. Pressure and Velocity Measurement:Relativepressure scales, pressure reference instruments, barometer, manometer, deadweight tester,pressure gauges and transducers, total and static pressure measurement in moving fluidsFlow measurement: Pressure differential meters: Orifice meter, Venturi meter, roto-meter.

UNIT- IV **MARKS-16**

Strain Measurement: Stress and strain, resistance strain gauges, gauge factor, straingauge electrical circuits, multiple gauge bridge, bridge constant, apparent strain andtemperature compensation, bending compensation. Motion, Force and Torque Measurement:Displacement measurement: Potentiometers, Linear variable differential transformers, rotaryvariable differential transformer; Velocity measurement: moving coil transducers; angularvelocity measurement: electromagnetic techniques, stroboscopic measurement; Force measurement: load cells, piezoelectric load cells; Torque measurement: measurement of torqueon rotatingshafts, Power estimation from rotational speed and torque.

UNIT- V **MARKS-16**

Introduction to control systems: Examples of control systems. Open loop and closedloop control, Mathematical modeling of dynamic systems: Transfer function, impulse responsefunction, block diagram of closed loop system, block diagram reduction, Transient and steadystate response analyses: First order systems, unit step and unit impulse response of first ordersystems, second order systems, unit step and unit impulse response of second order systems,transient response specifications, modeling of mechanical systems, modeling of electricalsystems, signal flow graphs, modeling of fluid systems, liquid level systems, hydraulic systems,modeling of thermal systems.

References:

1. Nakra and Chowdhry; Measurement and Control; TMH
2. Figiola RS & Beasley DE; Theory and Design for Mechanical Measurements; 3e John Wiley
3. Katsuhiko Ogata; Modern Control Engineering, 4e Pearson Education, New Delhi
4. Gopal; Control Systems Principles and Design; Tata McGraw Hill, New Delhi.
5. Backwith and Buck; Mechanical Measurements.
6. Swahney; Metrology and Instrumentation;

List of Experiment (Expandable)(Measurement & control)**:**

1- Study of various temperature measuring devices; thermo couple, RTD, gas thermo meters.
2- Measuring velocity of fluid flow by Ventura meter/ orifice meter/ pitot-tube.
3- Measuring torque and power generated by a prime mover by using pony brake

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Machine Component Design (BTME-0504)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0504	Machine Component Design	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **MARKS-16**

Stress concentration and fatigue: causes of stress concentration; stress concentration intension, bending and torsion; reduction of stress concentration, theoretical stress concentrationfactor, notch sensitivity, fatigue stress concentration factor, cyclic loading, endurance limit, S-NCurve, loading factor, size factor, surface factor. Design consideration for fatigue, Goodman andmodified Goodman's diagram, Soderberg equation, Gerber parabola, design for finite life,cumulative fatigue damage factor

UNIT- II **MARKS-16**

Shafts: Design of shaft under combined bending, twisting and axial loading; shock andfatigue factors, design for rigidity; Design of shaft subjected to dynamic load; Design of keys ands haft couplings.

UNIT- III **MARKS-16**

Springs: Design of helical compression and tension springs, consideration ofdimensional and functional constraints, leaf springs and torsion springs; fatigue loading ofsprings, surge in spring; special springs, **Power Screws** design of power screw and power nut,differential and compound screw, design of simple screw jack.

UNIT- IV **MARKS-16**

Brakes & Clutches: Materials for friction surface, uniform pressure and uniform weartheories, Design of friction clutches: Disk , plate clutches, cone & centrifugal clutches.Design of brakes: Rope, band & block brake, Internal expending brakes, Disk brakes.

UNIT- V **MARKS-16**

ournal Bearing: Types of lubrication, viscosity, hydrodynamic theory, design factors,temperature and viscosity considerations, Reynold's equation, stable and unstable operation,heat dissipation and thermal equilibrium, boundary lubrication, dimensionless numbers, Designof journal bearings, **Rolling-element Bearings:** Types of rolling contact bearing, bearing frictionand power loss, bearing life; Radial, thrust & axial loads; Static & dynamic load capacities;Selection of ball and roller bearings; lubrication and sealing.

References:-

1. Shingley J.E; Machine Design; TMH
2. Sharma and Purohit; Design of Machine elements; PHI
3. Wentzell Timothy H; Machine Design; Cengage learning
4. Mubeen; Machine Design; Khanna Publisher
5. Ganesh Babu K and Srithar k; Design of Machine Elements; TMH
6. Sharma & Agrawal; Machine Design; Kataria & sons
7. Maleev; Machnine Design;

List of Experiment (Pl. expand it):

Designing and sketching of components contained in the syllabus

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Dynamics of Machines (BTME-0505)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0505	Dynamics of Machine	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **MARKS-16**

Dynamics of Engine Mechanisms: Displacement, velocity and acceleration of piston;turning moment on crankshaft, turning moment diagram; fluctuation of crankshaft speed,analysis of flywheel.

UNIT- II **MARKS-16**

Governor Mechanisms: Types of governors, characteristics of centrifugal governors,gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertiagovernors.

UNIT- III **MARKS-16**

Balancing of Inertia Forces and Moments in Machines: Balancing of rotating masses,two plane balancing, determination of balancing masses (graphical and analytical methods),balancing of rotors, balancing of internal combustion engines (single cylinder engines, in-lineengines, V-twin engines, radial engines, Lanchester technique of engine balancing.

UNIT- IV **MARKS-16**

Friction: Frictional torque in pivots and collars by uniform pressure and uniform wearrate criteria. Boundary and fluid film lubrication, friction in journal and thrust bearings, concept offriction circle and axis, rolling friction. Clutches: Single plate and multi plate clutches, Coneclutches.

UNIT- V **MARKS-16**

Belt drives; Velocity ratio, limiting ratio of tension; power transmitted; centrifugal effecton belts, maximum power transmitted by belt, initial tension, creep; chain and rope drives;

Brakes: Band brake, block brakes, Internal and external shoe brakes, braking of vehicles.Dynamometer: Different types and their applications.

Dynamic Analysis of Cams: Response of un-damped cam mechanism (analytical method),follower response analysis by phase-plane method, jump and cross-over shock.

References:

1. Ambekar, AG; Mechanism and Machine Theory; PHI
2. Rattan SS; Theory of machines; TMH
3. Sharma and Purohit; Design of Machine elements; PHI
4. Bevan; Theory of Machines;
5. Ghosh and Mallik; Theory of Mechanisms and Machines; Affiliated East-West Press, Delhi
6. Norton RL; kinematics and dynamics of machinery; TMH
7. Grover; Mechanical Vibrations
8. Balaney; Theory of Machines by
9. Theory of Vibrations by Thomson

List of Experiment (Pl. expand it):

1- Study of various models of governors.
2- Study of gyroscopic motion and calculation of value of gyroscopic couple.
3- Study of various types of Cams and followers and drawing the cam profile with the help of test kit.
4- Study of various first order vibration systems.
5- To study working of friction clutches us

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Seminar /GD (BTME-0506)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0506	Seminar /GD	-	-	2	2	0	0	0	0	0	0	-	50	50	3 Hrs

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Project Work V (BTME-0507)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0507	Project Work V	-	-	4	4	0	0	0	0	0	0	-	50	50	3 Hrs

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OPERATION MANAGEMENT (BTME 0601)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0601	OPERATION MANAGEMENT	3	1	0	4	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I — Marks : 16

Operations Management (OM): Definition, history, industrial and IT revolution (ERP);tangible and service products continum, employment shift from agriculture, manufacturing toservice; customer orientation; basic process formats on product volume-variety graph; conceptof raw process time, critical WIP, bottle neck thru put and cycle-time with example of Penny-Fab-1,2; Little's law, best and worst case performance, thru put and cycle time formula in practical worst-case; criteria of performance, decision area, business strategy, environment scan, SWOT,Porters' five forces, core competency, competitive priorities of cost, quality, time and flexibility,order winners; production strategy of Make To Order-MTO, MTS and ATO (assemble to order); productivity, standard of living and happiness.

UNIT- II — Marks : 16

Life Cycle and PLC management; design steps, evolution and innovation,traditional v/s concurrent design, form and functional design, simplification and standardization,differentiation/mass customization, modular design, design for mfg and environment (DFM,DFE), technologies used in design. Service characteristics and classification based on people thingsv/s direct-indirect service actions, service triangle of customer, provider and system;technical and functional (delivery) service quality and other service performance factors, Valerie's service quality model; globalization of services.

UNIT- III — Marks : 16

transformation and value addition, selection based on cost, quality andflexibility considerations; reliability, bath-tub curve, series and parallel components, MTBF;availability and maintainability, preventive maintenance, TPM; value analysis; replacementmodels; Quality-definition, Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; product and process specs; the funnel-marble Mexperiment and variance reduction, process capability, six sigma and its implementation by DMAIC, QFD, TQM and ISO-9000.

UNIT- IV — Marks : 16

Impact of organization strategies on choice of region and site, existing ornew organization, decision-affecting factors for location, load distance, dimensional and factoranalysis methods, Brown-Gibson model, foreign locations, non-profit govt. services (health,school) locations. facility layout objectives and factors, basic layouts, merits and optimization;subjective relationship ranking method, computer programs CRAFT and 3-d modeling; problems of inventories flow and operators in process layout and inflexibility in product layout, flexiblecellular layout, group technology; capacity and equipment selection, importance of sparecapacity to reduce Q-length and cycle time.

UNIT- V **Marks : 16**

Programs/ procedures of production control (PPC): corporate and productionplanning process, aggregate plan, master production schedule and material planning; matchingsupply to demand fluctuations over timehorizon, Forecasting elements, time series, regression,causal and Delphi methods; use of LP in aggregate plan and HMMS model, assembly linebalancing, elemental task, station time and cycle time, balance delays; sequencing, Johnsonmethod for n-job 2/3 m/c, NP hard job-shop sequencing, heuristic dispatch rules; synchronousmfg, TOC, drum-buffer-rope and focus on bottleneck as control point; JIT lean mfg, Kanban and CONWIP shop floor controls, Kaizen

Reference Books:-

1. Chary SN; Production and Operations Management; TMH
2. Hopp W and Spearman M; Factory Physics; TMH
3. Gitlow Howard et al; Quality Management; TMH
4. Stevenson W J; Operations Management; TMH
Grading System 2012 - 13
5. Khanna RB; Production and Operations Management; PHI
6. Vollman, Berry et al; Manufacturing planning and control for SCM; TMH.
7. Chase Richard B et al; Operations management; SIE-TMH
8. Adam EE and Ebert RJ; Production and Operations Management Concepts…; PHI Learning.

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POWER PLANT ENGG (BTME-0602)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0602	POWER PLANT ENGG	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **Marks : 16**

Introduction to methods of converting various energy sources to electric power, directconversion methods renewable energy sources, solar, wind, tidal, geothermal, bio-thermal,biogas and hybrid energy systems, fuel cells, thermoelectric modules, MHD-Converter.

UNIT- II **Marks : 16**

Fossil fuel steam stations: Basic principles of sitting and station design, effect of climaticfactors on station and equipment design, choice of steam cycle and main equipment, recenttrends in turbine and boiler sizes and steam conditions, plant design and layout, outdoor andindoor plant, system components, fuel handling, burning systems, element of feed water treatment plant, condensing plant and circulating water systems, cooling towers, turbine room and auxiliary plant equipment., instrumentation, testing and plant heat balance.

UNIT- III **Marks : 16**

Nuclear Power Station: Importance of nuclear power development in the world andIndian context, Review of atomic structure and radio activity, binding energy concept, fissionand fusion reaction, fissionable and fertile materials, thermal neutron fission, important nuclearfuels, moderators and coolants, their relative merits, thermal and fast breeder reactors,principles of reactor control, safety and reliability features.

UNIT- IV **Marks : 16**

Hydro-Power Station: Elements of Hydrological computations, rainfall run off, flow andpower duration curves, mass curves, storage capacity, salient features of various types of hydrostations, component such as dams, spillways, intake systems, head works, pressure tunnels,penstocks, reservoir, balancing reservoirs, Micro and pico hydro machines, selection ofhydraulic turbines for power stations, selection of site.

UNIT-V **Marks : 16**

Power Station Economics: Estimation and prediction of load. Maximum demand, loadfactor, diversity factor, plant factor and their influence on plant design, operation and economics;comparison of hydro and nuclear power plants typical cost structures, simple problems on costanalysis, economic performance and tariffs, interconnected system and their advantages,elements of load dispatch in interconnected systems.

Reference Books

1- Nag PK; Power plant Engg; TMH
2- Al-Wakil MM; Power plant Technology; TMH
3- Sharma PC; Power plant Engg; Kataria and sons, Delhi
4- Domkundwar; Power Plant Engg; Dhanpatrai & sons.
5- Rajput RK; A text book of Power plant Engg.; Laxmi Publications.
6- Yadav R; Steam and gas turbine and power plant engg by

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METAL CUTTING & CNC MACHINES (BTME-0603)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0603	METAL CUTTING & CNC MACHINES	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **Marks : 16**

Classification of machine tools and their basic components; lathe- specification,components & accessories, various operations on lathes, capstan & turret lathes, tool layout,methods of thread production, machining time, single point cutting tools, tool signature and nomenclature

UNIT- II **Marks : 16**

Grinding: Types of grinding machines, surface, cylindrical and internal grinding,grinding wheels, specifications, wheel turning and dressing without eccentricity, centre-less grinding.

UNIT- III **Marks : 16**

Milling: Vertical, horizontal and universal type machines, specifications andclassifications of milling machines, universal dividing head plain and different indexing, gear cutting, milling cutters

UNIT- IV **Marks : 16**

Shapers: Classification and specifications, principle parts, quick return mechanism,shaper operations, speed feed, depth of cut, machining time. Surface qualities, equipment usedfor rating surfaces, rms. CLA value, causes for surface irregularities.

Gear Cutting: Die casting, methods of forming gears, generating process, Gear shaping, gear shaving, gear grinding gear testing

UNIT- V **Marks : 16**

Mechatronics: Introduction to control systems, analog control, transfer function,procedure for writing transfer function, signal flow diagram, introduction to electroniccomponents like switches, magnetic type, electromagnetic type, transducers and other sensors,servo motors, basics of CD-ROM players, PLC, applications, CNC machines

References:-

1. Rao PN; Manufacturing Technology vol I and II; TMH
2. Hazra Chadhary; Workshop Tech.II; Media Promoter and Pub
3. Lindberg RA; Processes and Materials of Manufacturing; PHI.
4. Raghuvanshi;BS; Work shop technology Vol-I, II; Dhanpat Rai Delhi
5. Alciatori DG, Histand MB; Introduction to Mechatronics and Measurement system; TMH
6. HMT; Production Processes; TMH

List of Experiment (Pl. expand it):-

1. To make a job on lathe machine with all operations like turning, step turning, drilling , tapper turning ,thread cutting and knurling .
2. Study of center less grinding machine/ tool and cutter type grinding machine.
3. Study of horizontal/ universal milling machine, diving head and indexing mechanism of it.
4. To cut a spur gear on milling machine using rapid indexing method.
5. Study of radial drilling machine and preparing a job on it.
6. To study a sapping machine to learn about working of quick return mechanism.

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I.C. ENGINE (BTME-0604)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME 0604	I.C. ENGINE	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **Marks : 16**

Internal Combustion Engine: S.I. and C.I. engines of two and four stroke cycles, realcycle analysis of SI and CI engines, determination of engine dimensions, speed, fuelconsumption, output, mean effective pressure, efficiency, factors effecting volumetric efficiency,heat balance, performance characteristics of SI and CI engines, cylinder arrangement, firingorder, power balance for multi-cylinder engines, valve timing

UNIT- II **Marks : 16**

Combustion in SI engines: Flame development and propagation, ignition lag, effect of airdensity, temperature, engine speed, turbulence and ignition timings, physical and chemicalaspects of detonation, effect of engine and fuel variables on knocking tendency, knock rating ofvolatile fuels, octane number, H.U.C.R., action of dopes, pre-ignition, its causes and remedy,salient features of various type combustion chambers, valve timing and firing order.

UNIT- III **Marks : 16**

Combustion in C.I. Engines: Times base indicator diagrams and their study, variousstages of combustion, delay period, diesel knock, octane number, knock inhibitors, salientfeatures of various types of combustion chambers, fuel, ignition, cooling, exhaust and lubricationsystems; Simple problems on fuel injection, various types of engines, their classification andsalient features. Rotary I. C. engines, their principles of working

UNIT- IV **Marks : 16**

I.C. Engine System: Fuels, ignition systems, cooling, exhaust/scavenging andlubrication system. Fuel metering in SI engine: Fuel injection in SI engine (MPFI & TBI), Theoryof carburetion, simple problems on carburetion. Fuel metering in CI engines: Fuel injection in CIengine and simple problems, various types of engines, their classification and salient features.Fuels: Conventional fuels and alternate fuels, engine exhaust emission, carbon monoxide, unburnthydro carbon, oxides of nitrogen, smoke, density, measurement and control, hydrogen as
alternate fuel.

UNIT- V **Marks : 16**

Supercharging: Effect of attitude on mixture strength and output of S.I. engines, low andhigh pressure super charging, exhaust, gas turbo-charging, supercharging of two stroke engines.

References:

1. Ganeshan V; Internal Combusion engines; TMH
2. Mathur ML & Sharma RP; A. Course in IC engines; DhanpatRai
3. Gupta HN; Fundamentals of IC Engines; PHI
4. Srinivasan S; Automotive Engines; TMH
5. Halderman JD and Mitchell CD; Automotive Engines theory and servicing; Pearson
6. DomKundwar; Internal Combustion Engines ; Dhanpat Rai Publications
7. Taylor GF; Internal Combustion Engines Theory & Practice; MIT Press
8. Richard Stone; Introduction to IC Engines; Society of Automotive Engr (Palgrave Mc Millan)

List of Experiments (Pl. expand it):

1. Determination of Valve timing diagram
2. Load test on Petrol Engine
3. Heat Balance of SI engine
4. Heat Balance of CI Engine
5. Study of Battery Ignition system and Electronic Ignition System
6. Study of Diesel fuel pump
7. Study of Diesel fuel injectors Grading System 2012 - 13
8. Study of a Carburetors
9. Study of Fuel Injection system in SI Engine
10. Study of lubricating system in CI Engines Grading System 2012 - 13

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HEAT & MASS TRANSFER (BTME-0605)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0605	HEAT & MASS TRANSFER	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **Marks : 16**

Basic Concepts: Modes of heat transfer, Fourier's law, Newton's law, Stefan Boltzmanlaw; thermal resistance and conductance, analogy between flow of heat and electricity,combined heat transfer process; **Conduction:** Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates, thermal diffusivity, linear one dimensional Msteady state conduction through a slab, tubes, spherical shells and composite structures, electrical analogies, critical-insulation-thickness for pipes, effect of variable thermal conductivity.

UNIT- II **Marks : 16**

Extended surfaces (fins): Heat transfer from a straight and annular fin (plate) for auniform cross section; error in measurement of temperature in a thermometer well, fin efficiency, fin effectiveness, applications; **Unsteady heat conduction:** Transient and periodic conduction, heating and cooling of bodies with known temperatures distribution, systems with infinite thermal conductivity, response of thermocouples

UNIT- III **Marks : 16**

Introduction, free and forced convection; principle of dimensional analysis, Buckingham 'pie' theorem, application of dimensional analysis of free and forced convection, empirical correlations for laminar and turbulent flow over flat plate and tubular geometry; calculation of convective heat transfer coefficient using data book.

UNIT- IV **Marks : 16**

Heat exchangers: Types- parallel flow, counter flow; evaporator and condensers, overall heat transfers coefficient, fouling factors, log-mean temperature difference (LMTD), method o heat exchanger analysis, effectiveness of heat exchanger, NTU method;

Mass transfer: Fick's law, equi-molar diffusion, diffusion coefficient, analogy with heat transfer, diffusion of vapour in a stationary medium.

UNIT- V **Marks : 16**

Thermal radiation: Nature of radiation, emissive power, absorption, transmission, reflection and emission of radiation, Planck's distribution law, radiation from real surfaces; radiation heat exchange between black and gray surfaces, shape factor, analogical electrical network, radiation shields

References:-

1. Sukhatme SP; Heat and mass transfer; University Press Hyderabad
2. Holman JP; Heat transfer; TMH
3. Nag PK; heat and Mass Transfer; TMH
4. Dutta BK; Heat Transfer Principles And App; PHI Learning
5. Mills AF and Ganesan V; Heat transfer; Pearson
6. Cengel Yunus A; Heat and Mass transfer;TMH
7. Yadav R; Heat and Mass Transfer; Central India pub-Allahabad
8. Baehr HD;Stephan K; Heat and Mass Transfer; MacMillan Pub
9. Incropera FP and Dewitt DP; Heat and Mass transfer; Wiley

List of Experiments **(Pl. expand it):-**

1 Conduction through a rod to determine thermal conductivity of material
2 Forced and free convection over circular cylinder
3 Free convection from extended surfaces
4 Parallel flow and counter flow heat exchanger effectiveness and heat transfer rate
5 Calibration of thermocouple
6 Experimental determination of Stefen-Boltzman constant

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Seminar /GD (BTME-0606)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0606	Seminar /GD	-	-	2	2	0	0	0	0	0	0	-	50	50	3 Hrs

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Project Work VI (BTME-0607)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0607	Project Work V	-	-	4	4	0	0	0	0	0	0	-	50	50	3 Hrs

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VIBRATION & NOISE CONTROL (BTME-0701)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max	Min (f)				
BTME -0701	VIBRATION & NOISE CONTRO	3	1	0	4	80	25	20	100	50	15	-	50	200	3 Hrs

UNIT- I — Marks : 16

Introduction: Types of heat exchangers heat transfer laws applied to heat exchangersconvection Coefficients, resistance caused by the walls and by fouling, overall heat transfercoefficient.

UNIT- II — Marks : 16

Thermal & hydraulic design of commonly used heat exchangers : LMTD & NTUMethods, correction factors**,** Double pipe heat exchangers , shell and tube heat exchangers,condensers , Evaporators ,Cooling and dehumidifying coils ,cooling towers, evaporativecondensers ,design of air washers, desert coolers.

UNIT- III — Marks : 16

TEMA standard: Tubular heat exchangers TEMA standard heat-exchangernomenclature,selection criteria for different types of shells and front and rear head ends; geometrical characteristics of TEMA heat exchangers.

UNIT- IV — Marks : 16

Review of mechanical Design, Materials of Construction, corrosion damage, testing and inspection.

UNIT- V — Marks : 16

Heat Pipe: Basics & its mathematical model, micro Heat Exchangers0, Use of Software in heat exchanger design

References:

1. Kern D Q, Kraus A D; Extended Surface Heat Transfer; TMH.
2. Kays, Compact Heat Exchangers and London, TMH.
3. Kokac, Heat Exchangers- Thermal Hydraulic fundamentals and design;TMH.
4. Tubular Exchanger Manufacturer Association (TEMA), and other codes Grading System 2013 - 14

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OPERATION RESEARCH (BTME-0702)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0702	OPERATION RESEARCH	3	1	2	6	80	25	20	100	-	-	-	100	100	3 Hrs

UNIT- I — Marks : 16

Linear system and distribution models: Mathematical formulation of linear systems by LP, solution of LP for two variables only, special cases of transportation and assignment and its solution, Vogel s forward looking penalty method, cell evaluation degeneracy, use of SW Lindo, Tora, Excell.

UNIT- II — Marks : 16

Supply chain (SCM): Definition, importance, expenditure and opportunities in SCM; integration of inbound, outbound logistics and manufacturing to SCM, flow of material money and information, difficulties in SCM due to local v/s system wide (global) optimization and uncertainties in demand and transportation; Bull-whip effect; customer value; IT, info-sharing and strategic partnerships; plant and warehouse-network configuration; supply contracts and revenue sharing; outsourcing; transportation, cross docking and distribution, forecasting models in SCM; coordination and leadership; change of purchasing role and vendor rating, variability from multiple suppliers.

UNIT- III — Marks : 16

Inventory models: Necessity of inventory in process and safety stock, problem of excess inventory and cycle time (=WIP/ Throughput), JIT/ lean mfg; basic EOQ/ EPQ models for constant review Q-system(S,s); periodic review, base stock P-system; service level, lead time variance and safety stock;; ABC, VED and other analysis based on shelf life, movement, size, MRP technique and calculations, lot sizing in MRP, linking MRP with JIT; evolution of MRP to ERP to SCM and e-business

UNIT- IV — Marks : 16

a) **Waiting Line Models** Introduction, Input process, service mechanism, Queue discipline, single server (M/M/1) average length and times by Little s formula, optimum service rate; basic multiple server models (M/M/s)
(b) **Competitive strategy**: concept and terminology, assumptions, pure and mixed strategies,
zero sum games, saddle point, dominance, graphical, algebraic and LP methods for solvinggame theory problems.

UNIT-V — Marks : 16

(a) **Decision analysis**: decision under certainty, risk probability and uncertainty; Hurwicz criteria; AHP- assigning weight and consistency test of AHP
(b) Meta-heuristics Definition of heuristic and meta-heuristic algorithms; introduction to Tabu search, Simulated Annealing and Genetic algorithms and solution of traveling salesman and
non linear optimization problems

References:-

1. Hillier FS and Liberman GJ; Introduction to Operations Research concept and cases; TMH
2. Simchi-Levi, Keminsky; Designing and managing the supply chain; TMH.
3. Srinivasan G; Quantitative Models In Operations and SCM; PHI Learning
4. Mohanty RP and Deshmukh SG; Supply Chain Management; Wiley India
5. Taha H; Operations research; PHI
6. Sen RP; Operations Research-Algorithms and Applications; PHI Learning
7. Sharma JK; Operations Research; Macmillan
8. Ravindran , Philips and Solberg; Operations research; Wiley India
9. Vollman, Berry et al; Manufacturing planning and control for SCM; TMH.
10. Bowersox DJ, Closs DJ, Cooper MB; Supply Chain Logisti Mgt; TMH
11. Burt DN, Dobler DW, StarlingSL; World Class SCM; TMH
12. Bronson R ;Theory and problems of OR; Schaum Series; TMH

List of experiments (please expand it)

1. Use computer and software to solve problems contained in the syllabus
2. Case studies in SCM

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AUTOMOBILE ENGG (BTME-0703)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0703	AUTOMOBILE ENGG	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I **Marks : 16**

Chassis & Body Engg: Types, Technical details of commercial vehicles, types of chassis,lay out, types of frames, testing of frames for bending & torsion on unutilized body frame, vehicle body and their construction, driver s visibility and methods for improvement, safety aspects of vehicles, vehicle aerodynamics, optimization of body shape, driver s cab design, body materials, location of engine, front wheel and rear wheel drive, four wheel drive.

UNIT- II **Marks : 16**

Steering System: front axle beam, stub axle, front wheel assembly, principles of types of wheel alignment, front wheel geometry viz. camber, Kingpin inclination, castor, toe-in and toeout, condition for true rolling motion, centre point steering, directional stability of vehicles, steering gear, power steering, slip angle, cornering power, over steer & under steer, gyroscopic effect on steering gears.

UNIT- III **Marks : 16**

Transmission System: Function and types of clutches, single plate, multi-plate clutch, roller & spring clutch, clutch lining and bonding, double declutching, types of gear Boxes, synchroniser, gear materials, determination of gear ratio for vehicles, gear box performance at different vehicle speed, automatic transmission, torque converters, fluid coupling, principle of hydrostatic drive, propeller shaft, constant velocity universal joints, differential gear box, rear axle construction.

UNIT- IV **Marks : 16**

Suspension system : Basic suspension movements, Independent front & rearsuspension, shock absorber, type of springs: leaf spring, coil spring, air spring, torsion bar,location of shackles, power calculations, resistance to vehicle motion during acceleration and breaking, power & torque curve, torque & mechanical efficiency at different vehicle speeds, weight transfer, braking systems, disc theory, mechanical, hydraulic & pneumatic power brake systems, performance, self-energisation, airbleeding of hydraulic brakes, types of wheels and tyres, tyre specifications, construction and material properties of tyres & tubes

UNIT- V **Marks : 16**

Electrical and Control Systems: storage battery, construction and operation of lead acid battery, testing of battery, principle of operation of starting mechanism, different drive systems, starter relay switch, regulator electric fuel gauge, fuel pump, horn, wiper, Lighting system, head light dazzling, signaling devices, battery operated vehicles, choppers. importance of maintenance, scheduled and unscheduled maintenance, wheel alignment, trouble Shooting
probable causes & remedies of various systems, microprocessor based control system for automobile, intelligent automobile control systems

References:

1. Crouse , Automotive Mechanics TMH.
2. Srinivasan S; Automotive engines; TMH
3. Gupta HN; Internal Combustion Engines; PHI;
4. Joseph Heitner, Automotive Mechanics, Principles and Practices, CBS Pub.
5. Kripal Singh, Automotive Engineering Khanna Pub.
6. Newton & Steeds , Automotive Engineering
7. Emission standards from BIS and Euro I and Euro-III

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List of experiments (please expand it):

Study of chassis, suspension, steering mechanisms, transmission, gear-box, differential systems, and electrical systems of various light and heavy automotive vehicles;

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BTME-0704 Elective-I

Design of Heat Exchangers (BTME-0704(A))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0704	Design of Heat Exchangers	3	1	2	6	80	25	20	100	-	-	-	100	100	3 Hrs

UNIT- I **Marks : 16**

Introduction: Types of heat exchangers heat transfer laws applied to heat exchangersconvection Coefficients, resistance caused by the walls and by fouling, overall heat transfer coefficient.

UNIT- II **Marks : 16**

Thermal & hydraulic design of commonly used heat exchangers : LMTD & NTUMethods, correction factors**,** Double pipe heat exchangers , shell and tube heat exchangers, condensers , Evaporators ,Cooling and dehumidifying coils ,cooling towers, evaporative condensers ,design of air washers, desert coolers.

UNIT- III **Marks : 16**

TEMA standard: Tubular heat exchangers TEMA standard heat-exchangernomenclature, selection criteria for different types of shells and front and rear head ends; geometrical characteristics of TEMA heat exchangers.

UNIT- IV **Marks : 16**

Review of mechanical Design, Materials of Construction, corrosion damage, testing and inspection.

UNIT- V **Marks : 16**

Heat Pipe: Basics & its mathematical model, micro Heat Exchangers0, Use of Software in heat exchanger design.

References:-

1. Kern D Q, Kraus A D; Extended Surface Heat Transfer; TMH.
2. Kays, Compact Heat Exchangers and London, TMH.
3. Kokac, Heat Exchangers- Thermal Hydraulic fundamentals and design;TMH.
4. Tubular Exchanger Manufacturer Association (TEMA), and other codes

Work Study & Ergonomics (BTME-0704(B))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME - 0704(B)	**Work Study & Ergonomics**	3	1	2	6	80	25	20	100	-	-	-	100	100	3 Hrs

UNIT -I- Marks : 16

Method study: purpose of work study, its objectives, procedure and applications; method study definition and basic procedure, selection of job, various recording techniques like outline process charts, flow process charts, man machine charts, two handed process charts, string diagram, flow diagram, multiple activity chart, simo, cyclographs and chrono-cyclographs; critical examination, development, installation and maintenance of improved method; principles of motion economy and their application in work design; micro motion study, memo motion study and their use in methods study.

UNIT-II Marks : 16

Work measurement: Introduction & definition, objectives and basic procedure of work measurement; application of work measurement in industries; time study: basic procedure, equipments needed, methods of measuring time, selection of jobs, breaking a job into elements; numbers of cycles to be timed; rating and methods of rating, allowances, calculation of standard time.

UNIT-III Marks : 16

Job evaluation and incentive schemes: Starlight line, Tailor, Merrick and Gantt incentive plansStandard data system; elemental and non-elemental predetermined motion , work factors system; Methods Time Measurement (MTM), MOST

UNIT-IV Marks : 16

Human factor engineering: Definition and history of development of human factors engineering, types & characteristics of man-machine-system, relative capabilities of human being and machines; development and use of human factor data; information input and processing: Introduction to information theory; factors effecting information reception and processing; coding and selecting of sensory inputs.

UNIT-V Marks : 16

Display systems and anthropometric data: Display- types of visual display, visual indicators and warning signals; factorial and graphic display; general principles of auditory and tactral display, characteristics and selection

References:-

1. ILO; work-study; International Labour Organization
2. Khan MI; Industrial Ergonomics; PHI Learning
3. Barrnes RM; Motion and Time Study; Wiley pub
4. Megaw ED; Contenmprory ergonomics; Taylor & fracis
5. Sandera M and Mc Cormick E; Human Factors in Engg and design; MGHill
6. Currie RM; Work study; BIM publications
7. Mynard; Hand book of Industrial Engg;

BTME-0705 Elective-II

Industrial Robotics (BTME-0705(A))

Course Code	Title of the Paper	Periods Per				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0705(A)	**Industrial Robotics**	3	1	2	6	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I **Marks : 16**

Introduction: Need and importance, basic concepts, structure and classification of industrial robots, terminology of robot motion, motion characteristics, resolution, accuracy, repeatability, robot applications

UNIT- II **Marks : 16**

End Effectors and Drive systems: Drive systems for robots, salient features and comparison, different types of end effectors, design, applications..

UNIT- III **Marks : 16**

Sensors: Sensor evaluation and selection – Piezoelectric sensors – linear position and displacement sensing, revolvers, encoders, velocity measurement, proximity, tactile, compliance and range sensing. Image Processing and object recognition..

UNIT- IV . **Marks : 16**

Robot Programming: Teaching of robots, manual, walk through, teach pendant, off line programming concepts and languages, applications

UNIT- V **Marks : 16**

Safety and Economy of Robots: Work cycle time analysis, economics and effectiveness of robots, safety systems and devices, concepts of testing methods and acceptance rule for industrial robots

References:-

1. Mittal RK, Nagrath IJ; Robotics and Control; TMH
2. Groover M.P,Weiss M, Nagel,OdreyNG; Industrial Robotics-The Appl…; TMH
3. Groover M.P; CAM and Automation; PHI Learning
4. Spong Mark and Vidyasagar; Robot Modelling and control; Wiley India
5. Yoshikava ; Foundations of Robotics- analysis and Control; PHI Learning;
6. Murphy ; Introduction to AI Robotics; PHI Learning
7. FU KS, Gonzalez RC, Lee CSG; Robotics -Control, sensing.; TMH
8. Shimon, K; Handbook of Industrial Robots; John Wiley & Sons,.
9. Ghosal Ashitava; Robotics Fundamental concepts and analysis; Oxford
10. Saha S; Introduction to Robotics; TMH
11. Yu Kozyhev; Industrial Robots Handbook; MIR Pub.

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Total Quality Management and SQC (BTME-0705 (B))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0705 (B)	Total Quality Management and SQC	3	1	2	6	80	25	20	100	-	-	-	100	100	3 Hrs

UNIT- I — Marks : 16

Evolution of total quality management, historical perspective, teamwork, TQM and ISO9000; information technology and Business Process Re-engineering (BPR); TPM and qualityawards; aids and barriers to quality mgt, creating vision and initiating transformation, establishing programs for education and self coordination, policy setting and review, flowchart of policy mgt and relation with daily mgt. improvements, measurement of key indicators; quality mgt leader; cross functional teams and

UNIT- II — Marks : 16

Process- definition, variation and feedback, funnel-marble experiment- rules of adjustment and its effects, quality-definition, goalpost and kaizen view, quality of design, conformance and performance; Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; Deming's theory of mgt, fourteen points and variance reduction; attributes enumerative and variables analytic studies.

UNIT- III — Marks : 16

SQC-Control charts: basic discrete and continuous distributions, measures of centraltendency, variability and shapes, sampling, size and central value theorem, control chart structure, process plotting and stability, study of out-of-control evidences, defect detection and prevention, use of control charts in evaluating past, present and future trends; attribute control charts, count and classification charts, construction and interpretation of p , np , c and u charts PDSA cycle(plan, do, study, act), and R charts, and s charts, individual and moving range chart,trial control limits and out of control points.

UNIT-I V — Marks : 16

Process diagnostics: Between and Within Group variations, periodic and persistentdisturbances, control chart patterns-natural, level-shift, cycle, wild, multi-universe, relationshipand other out of control patterns; diagnosing a process, brainstorming; cause-effect, Ishikava,interrelationship, systematic and matrix diagrams; change concepts and waste elimination

UNIT- V — Marks : 16

Process improvement: Performance and technical specifications, attribute-process andvariable-process capability studies; unstable and stable process capability studies andexamples; attribute and variable improvement studies; Inspection: acceptance sampling(AS)- lotformation, single, double and multiple/sequential sampling plans, operating characteristic (OC)curve, producer and consumer risk, theoretical invalidation of AS, kp rule for stable and chaotic processes.

References:-

1. Gitlow HS, Oppenheim et al; Quality Management; TMH
2. Gryna FM; Juran s Quality Planning and Analysis; TMH
3. Crosby Philips; Quality is still free; New Amer Library
4. Kulkarni VA and Bewoor AK; Quality Control; Wiley
5. Jankiraman B and Gopal RK; Total Quality Management- Text and Cases; PHI Learning
6. Sugandhi L and Samual A; Total Quality Management; PHI Learning
7. Subburaj R; Total Qality Management; TMH
8. Naidu Babu and Rajendran; TQM; New age International pub;
9. Chase Richard B et al; Operations management; SIE-TMH
10. Chary SN; Production and Operations Management; TMH

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Project Work -Minor (BTME-0706)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0706	Project Work - Minor	-	-	2	2	0	0	0	0	100	30	50	150	150	3 Hrs

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Industrial Training (BTME-0707)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0707	Industrial Training	-	-	4	4	0	0	0	0	50	15	50	100	100	3 Hrs

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CAD/CAM/CIM LAB-II (BTME-0708)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME 0708	CAD/CAM /CIM LAB-I	-	-	2	2	-	-	-	-	50	15	50	100	100	3 Hrs

List of Experiments (please expand it):

1. 2D and 3D modeling on CAD software
2. Use of CAM software for writing CNC programs
3. Study of automatic and semi automatic control system and writing the electrical analogy.
4. Production & layout for GT for group of jobs to be manufactured
5. A case study / tutorial using CAPP Software
6. Writing M & G codes for given operations.
7. Robot and AGV programming

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REFRIGERATION & AIR CONDITIONING (BTME-0801)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0801	REFRIGERATION & AIR CONDITIONING	3	1	0	4	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I — Marks : 16

Introduction: Principles and methods of refrigeration, freezing; mixture cooling by gasreversible expansion, throttling, evaporation, Joule Thomson effect and reverse Carnot cycle;unit of refrigeration, coefficient of performance, vortex tube & thermoelectric refrigeration,adiabatic demagnetization; air refrigeration cycles- Joule's cycle Boot-strap cycle, reduced ambient cycle and regenerative cooling cycles.

UNIT- II — Marks : 16

Vapour compression system: Vapor compression cycle, p-h and t-s diagrams,deviations from theoretical cycle, sub-cooling and super heating, effects of condenser andevaporator pressure on cop; multi-pressure system: removal of flash gas, multiple expansion &compression with flash inter cooling; low temperature refrigeration: production of low temperatures, cascade system, dry ice, production of dry ice, air liquefaction system.

UNIT- III [— Marks : 16

(a) **Vapour absorption system**: Theoretical and practical systems such as aquaammonia,electrolux & other systems; (b) **Steam jet refrigeration**: Principles and working,simple cycle of operation, description and working of simple system, (c) **refrigerants:**nomenclature & classification, desirable properties, common refrigeration, comparative study,leak detection methods, environment friendly refrigerants and refrigerant mixtures, brine and itsproperties

UNIT- IV — Marks : 16

Psychrometric: Calculation of psychrometric properties of air by table and charts;psychrometric processes: sensible heating and cooling, evaporative cooling, cooling anddehumidification, heating and humidification, mixing of air stream, sensible heat factor; principleof air conditioning, requirements of comfort air conditioning, ventilation standards, infiltrated airload, fresh air load human comfort, effective temperature & chart, heat production & regulation of human body,

UNIT- V — Marks : 16

Air conditioning loads: calculation of summer & winter air conditioning load, bypassfactor of coil, calculation of supply air rate & its condition, room sensible heat factor, grandsensible heat factor, effective sensible heat factor, dehumidified air quantity. Problems on cooling load calculation. Air distribution and ventilation systems

References:-

1. Arora CP; Refrigeration and Air Conditioning; TMH
2. Sapali SN; Refrigeration and Air Conditioning; PHI
3. Ananthanarayan; Basic Refrigeration and Air conditioning; TMH
4. Manohar Prasad; Refrigeration and Air Conditioning; New Age Pub
5. Ameen; Refrigeration and Air Conditioning; PHI
6. Pita ; Air conditioning Principles and systems: an energy approach; PHI
7. Stoecker W.F, Jones J; Refrigeration and Air conditioning; McGH, Singapore
8. Jordan RC and Priester GB Refrigeration and Air Conditioning, PHI USA
9. Arora RC; Refrigeration and Air conditioning; PHI Learning

List of Experiments **(Please Expand it):-**

1. General Study of vapor compression refrigeration system.
2. General Study of Ice Plant
3. General Study and working of cold storage
4. General Study Trane Air Condition (Package Type).
5. General Study of Electrolux Refrigeration

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6. General Study One tone Thermax refrigeration unit.
7. General Study of Water cooler
8. General Study of Psychrometers (Absorption type)
9. General Study of Leak Detectors (Halide Torch).
10. General Study and working of Gas charging Rig.
11. General Study of window Air Conditioner.
12. General Study and working of Vapor compression Air conditioning Test rig.
13. Experimentation on Cold Storage of Calculate COP & Heat Loss.
14. Experimentation on Vapor compression Air Conditioning test rig.
15. Changing of Refrigerant by using Gas Charging Kit.

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MACHINE DESIGN
(BTME-0802)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0802	MACHINE DESIGN	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hrs

UNIT- I — Marks : 16

Design of Belt, Rope and Chain Drives: Methods of power transmission, selection anddesign of flat belt and pulley; Selection of V-belts and sheave design; Design of chain drives,roller chain and its selection; Rope drives, design of rope drives, hoist ropes.

UNIT- II — Marks : 16

Spur and Helical Gears: Force analysis of gear tooth, modes of failure, beam strength,Lewis equation, form factor, formative gear and virtual number of teeth; Gear materials; Surfacestrength and wear of teeth; strength against wear; Design of straight tooth spur and Helical
Gears.

UNIT- III — Marks : 16

Design of I.C. Engine Components: General design considerations in I C engines;design of cylinder; design of piston and piston-rings; design of connecting rod; design ofcrankshaft

UNIT- IV — Marks : 16

Design of Miscellaneous Components: design of Flanged coupling; Rigid coupling,Design of Pressure vessels subjects to internal pressure, external pressure, design of penetration, design of flanges, cone cylinder junctions ,Materials, Fabrication.

UNIT-V — Marks : 16

Optimization: Basic concept of optimization, classification of optimization, optimizationtechniques, engineering applications of optimization. Classical optimization techniques:unconstrained optimization single-variable optimization, multivariable optimization, solution by direct search method, solution by Lagrange-multipliers method.

References:

1. Shigley J.E.; Machine Design; TMH
2. BhandariVB; Design of Machine Elments; TMH
3. Sharma CS and Purohit K; Design of Machine Elements; PHI Learning.
4. Hall and Somani; Machine Design; Schaum Series; TMH
5. Wentzell TH; Machine Design; Cegage Learning
6. Sharma & Agrawal; Machine Design; Katson
7. Kulkarni SG; Machine Design; TMH
8. Abdul Mubeen; Machine Design; Khanna Publishers
9. Juvinall RC, Marshek KM; Fundamentals of Machine Component Design; Wiley
10. Norton R; Design Of Machinery; TMH

List of Experiment (Pl. expand it):

Designing and sketching of components contained in the syllabus

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BTME-0803 Elective-III

Energy Management & Audit (BTME-0803(A))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory				Practical					
		L	T	P	C	Max (a)	Min (b)	MST (c)	Total (d = a+c)	Max (e)	Min (f)	TW (g)	Total (h= e+g)		
BTME-0803	Energy Management & Audit	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I **Marks : 16**

Energy Management: Concept of energy management, energy demand and supply,economic analysis; Duties and responsibilities of energy managers.Energy Conservation: Basic concept, energy conservation in Household, Transportation,Agricultural, service and Industrial sectors, Lighting, HAVC

UNIT- II **Marks : 16**

Energy Audit: Definition, need and types of energy audit; Energy management (Audit)approach: Understanding energy cost, bench marking, energy performance, matching energyuse to requirement, maximizing system efficiencies, optimizing the input energy requirement;Fuel & energy substitution; Energy audit instruments; Energy conservation Act; Duties andresponsibilities of energy manager and auditors

UNIT- III **Marks : 16**

Material energy balance: Facility as an energy system; Method for preparing processflow; material and energy balance diagrams.Energy Action Planning: Key elements, force field analysis; Energy policy purpose, perspective,content, formulation, rectification

UNIT- IV **Marks : 16**

Monitoring and Targeting: Definition monitoring & targeting; Data and informationanalysis.Electrical Energy Management: energy conservation in motors, pumps and fan systems; energyefficient motors

UNIT- V **Marks : 16**

Thermal energy management: Energy conservation in boilers, steam turbine andindustrial heating system; Application of FBC; Cogeneration and waste heat recovery; Thermalinsulation; Heat exchangers and heat pump; Building Energy Management

References:-

1. Murphy & Mckay, Energy Management, BSP Books Pvt. Ltd.
2. Smith CB; Energy Management Principle, Pergamon Press, New York.
3. Rajan GG, Optimising Energy Efficiency in Industry, TMH.
4. Callaghan P O, Energy Management, McGraw-Hill Book Company.
5. Amit Kumar Tyagi, Handbook on Energy Audit and Management, Tata Energy Research Institute.
6. Bureau of Energy Efficiency, Study material for energy Managers and Auditors: Paper I to V.
7. Hamies; Energy Auditing and Conservation: Method, Measurement , Hemisphere, Washington.
8. Witty, Larry C, Industrial Enegy Management Utilisation, Hemisphere Publishers, Washington
9.Kreith & Goswami, Energy Management and Conservation Handbook, CRC Press.

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Tools Design and Machine Tools (BTME-0803(B))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME-0803(B)	Tools Design and Machine Tools	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I **Marks : 16**

Basic Features and Kinematics of Machine Tools: Features of basic machine tools;construction and operation, types of machine tools, machine tools motions, transmissionrotationin to rotation, rotation in to translation, kinematic-structures of machine tools:elementary, complex and compound structure, kinematic-features of gear shapers and gearhobbing machine.

UNIT- II **Marks : 16**

Regulation of Speed: Design of gear boxes- need for variation of speed, selection ofspeed range, laws of stepped regulation, standardization of speeds, speed diagram, analysis ofproductivity loss, kinematic advantage of GP, structural diagrams, ray diagram and speed chart.Gear Drives: Belt and cone pulley, slip gear type, north gear drive, draw key gear drive, clutchtype, mechanical step less drives, electrical drives; hydraulic drive

UNIT- III **Marks : 16**

Design of Metal working Tools: Design of press working tools, shearing, piercing,blanking, dies, compound die design principles for forging dies, bending, forming drawing dies,tooling for forging - design principles for forging dies, drop forging, upset forging, designprinciples and practice for rolling, roll press design.

UNIT- IV **Marks : 16**

Design of Jigs and Fixtures: Principles of location, locating method and devices,principles of clamping, clamping devices, drilling jigs, types, drill bushes, fixture and economics,types of fixture, milling, grinding, broaching, assembly fixtures indexing jig and fixtures, indexingdevices.

UNIT- V **Marks : 16**

Design of Gauges and Inspection Features: Design of gauges for tolerance fordimensions and form inspection; dies and mould design for Ppastics & rubber parts: compression molding, transfer molding, blow molding.

References:-

1. Mehta N.K.; Machine Tool Design and Numerical Control; TMH
2. Sen G.C, Bhattacharya A; Principles of Machine Tools; New Central Book Agency.
3. Donaldson; Tool Design T.M.H.
4. Jain KC and Chitale AK; Text Book Of Production Engineering; PHI Learning
5. Juneja, Sekhon and Seth; Fundamentals of Metal Cutting and Machine Tools; New Age.
6. Krar SF, Gill AR, Smid P; Technology of Machine Tools;TMH
7. Sharma P.C; Production Engineering; Chand S
8. Wilson; Fundamentals of Tool Design; ASTME
9. Paqwin J.R; Die Design Handbook; The Industrial Press-NY
10. ASTME; Die Design Hand Book; McGraw Hill
11. Archinov; Metal Cutting & Cutting Tool Design; MIR Publishers Moscow
12. Kempster M.H.A; Introduction to Jig and Tool Design; FLBS.

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BTME-0804 Elective-IV

CAD/CAM/CIM (BTME-0804(A))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0804	CAD/CAM/CIM	3	1	2	6	80	25	20	100	-	-	-	-	100	3 Hrs

UNIT- I — Marks : 16

Introduction: Information requirements of mfg organizations; business forecasting and aggregate production plan; MPS, MRP and shop floor/ Production Activity Control (PAC); Mfg as a system, productivity and wealth creation; production processes on volume-variety axes; importance of batch and job shop production; CIM definition and CIM wheel, evolution and benefits; CIM as a subset of Product Life Cycle (PLC) mgt; design for mfg (DFM) and concurrent engg. product design in conventional and CIM environment; terms like CAD, CAE, Cam, CAP, CAPP, CATD and CAQ..

UNIT- II — Marks : 16

Graphics and standards: Raster scan, coordinate systems for model (M/ WCS) user and display; database for graphic modeling; PDM, PIM, EDM; define EDM, features of EDM; basic transformations of geometry-translation, scaling, rotation and mirror; introduction to modeling software; need for CAD data standardization; developments in drawing data exchange formats; GKS, PHIGS, CORE, IGES, DXF STEP DMIS AND VDI; ISO standard for exchange of Product Model data-STEP and major area application protocols.

UNIT- III — Marks : 16

Geometric Modeling: Its use in analysis and mfg; 2D and 3D line, surface and volume models; linear extrusion and rotational sweep; Constructive Solid Geometry (CSG); basics of boundary presentation- spline, Bezier, b-spline, and NURBS; sculpture surfaces, classification, basics of coons, Bezier, b-spline and ruled surfaces; tweaking, constraint based parametric modeling; wire-frame modeling, definition of point, line and circle; polynomial curve fitting; introduction to rapid prototyping

UNIT- IV — Marks : 16

Numeric control and part programming: Principles of NC machines, CNC, DNC; NC modes of point to point, -line and 2D, 3D contouring; NC part programming; ISO standard for coding, preparatory functions(G)-motion, dwell, unit, preset, cutter compensation, coordinate and plane selection groups; miscellaneous (M) codes; CLDATA and tool path simulation; ISO codes for turning tools and holders; ATC, modular work holding and pallets; time and power estimation in milling, drilling and turning; adaptive control, sequence control and PLC; simple part programming examples.

UNIT- V — Marks : 16

Group Technology: Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods; concept of part families and coding; hierarchical, attribute and hybrid coding; OPITZ, MICLASS and DCLASS coding; FMS; material handling; robots, AGV and their programming; agile mfg; Computer Aided Process Planning (CAPP), variant/ retrieval and generative approach References.

References:-

1. S.Kant Vajpay; Principles of CIM; PHI
2. Rao PN; CAD/CAM;TMH
3. Groover MP; Automation, Production Systems & CIM; P.H.I.
4. Rao PN, Tiwari NK, Kundra TK; Computer Aided Manufacturing; TMH
5. Alavudeen A, Venkteshwarn N; Computer Integrated Mfg; PHI
6. Radhakrishnan P, Subramanian S and Raju V; CAD/CAM/CIM; New age Pub List of Experiments (please expand it):
    1. 2D and 3D modeling on CAD software
    2. Use of CAM software for writing CNC programs
    3. Study of automatic and semi automatic control system and writing the electrical analogy.
    4. Production & layout for GT for group of jobs to be manufactured
    5. A case study / tutorial using CAPP Software
    6. Writing M & G codes for given operations.
    7. Robot and AGV programming

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Simulation & Process Modeling. (BTME-0804(B))

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory				Practical					
		L	T	P	C	Max (a)	Min (b)	MST (c)	Total (d = a+c)	Max (e)	Min (f)	TW (g)	Total (h= e+g)		
BTME 0804 (B)	Simulation & Process Modeling.	3	1	2	6	80	25	20	100	-	-	-	100	100	3 Hrs

UNIT- I **Marks : 16**

Introduction to modeling and simulation: Modeling and simulation methodology, systemmodeling, concept of simulation; gaming; static, continuous and discrete event simulation.

UNIT- II **Marks : 16**

Basic concept of probability, generation and characteristics of random variables,continuous and discrete variables and their distributions; mapping uniform random variables toother variable distributions; linear, nonlinear and stochastic models.

UNIT- III **Marks : 16**

Introduction to Queuing Theory: Characteristics of queuing system, Poisson's formula,birthdeath system, equilibrium of queuing system, analysis of M/M/1 queues. Introduction tomultiple server Queue models M/M/c Application of queuing theory in manufacturing andcomputer system

UNIT- IV **Marks : 16**

System Dynamics modeling: Identification of problem situation, preparation of causalloop diagrams and flow diagrams, equation writing, level and rate relationship, Simulation ofsystem dynamics models

UNIT- V **Marks : 16**

Verification and validation: Design of simulation experiments, validation of experimentalmodels, testing and analysis. Simulation languages comparison and selection, study ofsimulation software - Arena, Pro-model, SIMULA, DYNAMO, STELLA, POWERSIM.

References:-

1. Law AM and Kelton WD; Simulation Modeling and Analysis; TMH
2. Gordon G., System simulation, PHI Learningl
3. Banks J; Hand book of Simulation; John Wiley.
4. Taha H, Operations Research; PHI.
5. Hillier FS, Liberman GJ; Introduction to OR; TMH.
6. Deo N; System Simulation with Digital Computer; PHI Learning
7. Harrell C, Ghosh B, Bowden R; Simulation Using Promodel; MG Hill
8. Seila, Ceric and Tadikmalla; Applied Simulation Modeling, Cengage
9. Payer T., Introduction to system simulation, McGraw Hill.
10. Sushil, System Dynamics, Wiley Eastern Ltd.
11. Spriet JA; Computer Aided Modeling and Simulation, Academic Press INC; USA

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PROJECT WORK-MAJOR (BTME-0805)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0805	PROJECT WORK-MAJOR	-	-	6	6	-	-	-	-	150		100	250	250	3 Hrs

Major Project

Objectives of the course Minor/Major Project are:-

To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.

To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.

To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.

To adapt students for latest development and to handle independently new situations.

To develop good expressions power and presentation abilities in students.

The focus of the Major Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need banalysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system

(if any)-

Working schedule

The faculty and student should work according to following schedule:Each student undertakes substantial and individual project in an approved area of the subject andsupervised by a member of staff.The student must submit outline and action plan for the projectexecution (time schedule) and the same be approved by the concerned faculty.Action plan for Major Project work and its evaluation scheme #(Suggestive)

Task/Process Week Evaluation Marks For Term

Work#

Orientation of students by HOD/Project

Guide

1st - -

Literature survey and resource collection 2nd - -

Selection and finalization of topic before a

committee*

3rd Seminar-I 10

Detailing and preparation of Project
(Modeling, Analysis and Design of Project
Work 4th to 5th - 10
Development stage
Testing, improvements, quality control of
project
6th to 10th
11th
- 25
Acceptance testing 12th - 10
Report Writing 13th to 15th - 15
Presentation before a committee
(including user manual, if any)
16th - Seminar-II 30

* Committee comprises of HOD, all project supervisions including external guide from industry (if any)

The above marking scheme is suggestive, it can be changed to alternative scheme depending on the type of project, but the alternative scheme should be prepared in advance while finalizing the topic of project before a committee and explained to the concerned student as well.

NOTE: At every stage of action plan, students must submit a write up to the concerned guide

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CAD/CAM/CIM LAB-II (BTME-0806)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BME-0806	CAD/CAM/ CIM LAB-II	-	-	2	2	-	-	-	0	50	-	50	100	100	3 Hrs

List of Experiments (please expand it):

1. 2D and 3D modeling on CAD software
2. Use of CAM software for writing CNC programs
3. Study of automatic and semi automatic control system and writing the electrical analogy.
4. Production & layout for GT for group of jobs to be manufactured
5. A case study / tutorial using CAPP Software
6. Writing M & G codes for given operations.
7. Robot and AGV programming

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Seminar /GD (BTME-0807)

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
						Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
		L	T	P	C	Max (a)	Min (b)			Max (e)	Min (f)				
BTME -0807	Seminar /GD	-	-	2	2	0	0	0	0	0	0	-	50	50	3 Hrs