BME-C406
FLUID MECHANICS AND FLUID MACHINES

MM: 100
Time: 3 Hr.
L T P
3 1 0

Sessional: 30
ESE: 70
Credit : 4

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Definition of fluid, Newton's law of viscosity, Units and Dimensions-Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension,Measurement of pressure by manometers and mechanical gauges, Buoyancy; Stability of immersed and floating bodies ,Need for dimensional analysis – methods of dimension analysis – Similitude – types of similitude Dimensionless parameters – application of dimensionless parameters – Model analysis.   8

UNIT II

Control volume- application of continuity equation and momentum equation, Incompressible flow, Bernoulli's equation and its applications, Couette and Poisuielle flow, laminar flow through circular conduits and circular annuli.

Concept of boundary Layer-Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sublayer, separation and its control.   8

UNIT III

Fluid Kinematics, Description of Fluid flow: Lagrangian and Eulerian approach; Types of fluid Flows, Steady and unsteady, Uniform and non-uniform, Laminar and turbulent flows, Acceleration of a fluid particle along a straight and curved path,Stream function and Velocity potential.

Major and Minor energy losses, Hydraulic gradient and total energy lines; Flow in sudden expansion, contraction, bends.   9

UNIT IV

Classification of Fluid Mechanics, Application of momentum and momentum equation to flow through hydraulic machinery, Euler s fundamental equation. Various efficiencies – velocity components at entry and exit of the rotor, velocity triangles.

Impact of Jet on vanes in stationary and moving vanes, Classification of water turbines, heads and efficiencies, velocity triangles- Axial, radial and mixed flow turbines- Pelton wheel, Francis turbine and Kaplan turbines, working principles.   8

Faculty of Engineering & Technology, GKV, Haridwar   *Department of Mechanical Engineering*

UNIT V

Centrifugal Pumps, reciprocating pump, working principleClassifications of pumps, vector diagram efficiencies of centrifugal and reciprocating pumps, specific speed, model testing, cavitation and separation, performance characteristics, Draft tube- Specific speed, unit quantities.

7

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Munson, B.R., Young, D.F., and Okiishi, T.H., "Fundamentals of Fluid Mechanics", 5th Ed., John Wiley & Sons, ISBN: ES8-1-118-11613-5.	2005
2.	Yuan, S.W., "Foundation of Fluid Mechanics", 2nd Ed., Prentice-Hall, ISBN- 0133298477.	1988
3.	White, F.M., "Fluid Mechanics", 5th Ed., McGraw-Hill, ISBN 0073398276.	2002
4.	Govind Rao, N.S., "Fluid Flow Machines", Tata McGraw-Hill, **ISBN**, 0074518542.	1998
5.	Dixon, S.L., "Fluid Mechanics and Thermodynamics of Turbomachinery", 5th Ed., Butterworth-Heinemann,**ISBN**-9780080470627.	2005

BME C407
MANUFACTURING SCIENCE AND PROCESS

MM: 100   **Sessional: 30**
Time: 3 Hr.   **ESE: 70**
L T P   **Credit: 3**
3 0 0

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Introduction: Importance of manufacturing. Economic & technological considerations in manufacturing. Survey of manufacturing processes. Materials & manufacturing processes for common items.   4

Casting and moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage, riser design, casting defects and residual stresses.   4

UNIT II

Metal Forming Processes I: Elastic & plastic deformation, yield criteria. Hot working vs cold working. Load required to accomplish metal forming operation. Analysis (equilibrium equation method) of forging process with sliding friction sticking friction and mixed condition for slab and   disc. Work   required   for   forging,   Hand,   Power,   Drop   Forging. 4

Metal Forming Processes II: Analysis of Wire/strip drawing and max. reduction, Tube drawing, Extrusion and its application. Condition for Rolling force and power in rolling. Rolling mills. Design, lubrication and defects in metal forming.   4

UNIT III

Metal cutting: Single and multi-point cutting; Orthogonal cutting, various force components: Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, cutting tool materials, cutting fluids, Coating; Turning, Drilling, Milling and finishing processes, Introduction to CNC Machining   8

UNIT IV

Powder Metallurgy: Powder metallurgy manufacturing process. The process, advantage and applications.   4

Jigs & Fixtures: Locating & clamping devices/principle. Jigs and Fixtures and its applications. 4

Manufacturing of Plastic Components: Review of plastics, and its past, present & future uses. Injection moulding. Extrusion of plastic section. Welding of plastics. Future of plastic & its applications. Resins & Adhesives.   4

UNIT V

Introduction to non-conventional Machining: Benefits, application and working principle of EDM, ECM, LBM, EBM, USM. AJM, WJM.   **4**

Unconventional Metal forming processes: Unconventional metal forming processes such as explosive forming, electro- magnetic, electro-hydraulic forming.   **4**

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	DeGarmo, E. P., Black, J.T., and Kohser, R.A., "Materials and Processes in Manufacturing", Prentice-Hall of India,ISBN-10: 0470924675.	1997
2.	Kalpakjian, S., and Schmid, S.R., "Manufacturing Engineering and Technology", Pearson Education,ISBN-10: 0133128741.	2000
3.	Groover, M.P., "Fundamentals of Modern Manufacturing", John Wiley & Sons, ISBN-10: 0470467002.	2002
4.	Lindberg, R.A., "Processes and Materials of Manufacture", PrenticeHall of India, ISBN-10: 9788120306639.	1990
5.	Rao,P.N., "Manufacturing Technology", (Vol. 2), Tata McGraw-Hill, ISBN-10: 9383286628.	1998

BME-C408
KINEMATICS & DYNAMICS OF MACHINES

MM: 100   **Sessional: 30**
Time: 3 Hr.   **ESE: 70**
L T P   **Credit: 4**
310

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I
Introduction: Links-types, Kinematics pairs-classification, Constraints-types, Degree of Freedom- Grashof's law, Grubler's equation, linkage mechanisms, inversions of four bar linkage, slider crank chain and double slider crank chain, Mechanical advantage, Transmission angle, Quick return mechanism, Rocker mechanisms
Velocity in Mechanisms: Displacement and Velocity analysis of simple mechanism, slider crank mechanism using relative velocity method and instantaneous centers in mechanism, Kennedy's theorem, instantaneous center method.   **8**

UNIT II
Acceleration in Mechanisms: Acceleration diagram, Acceleration analysis of simple mechanism, slider crank mechanism using relative velocity method diagram, Coriolis component of acceleration, Analysis of Universal Hook's joint.
Kinematics Synthesis of Planar Linkages: Introduction to linkage synthesis, Three position synthesis of four bar and slider crank mechanisms for motion and path generation.   **6**

UNIT III
Friction: Surface contacts- sliding and rolling friction, friction drives: Friction of pivot and collar Bearings and friction of Single plate, Multiplate and Cone clutches, Belts and pulleys, Flat and V-belts design and selection, friction in external and internal shoe brakes, Band and Block brakes.   **8**

UNIT IV
Cams: Classification of cams and followers- Terminology and definitions- Cam profile synthesis for knife edge, roller and flat faced followers by graphical methods for Uniform velocity, Parabolic, and Simple harmonic motions, Cams with specified contour- Analytical cam design– tangent and circular cams.   **9**

UNIT V
Gears: Classification & terminology, fundamental law of gearing and conjugate action, Involute and cycloidal gear profiles, interference, under cutting, minimum number of teeth on gear and pinion to avoid interference, simple, compound and planetary gear trains.   **9**

Suggested Books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Martin, G.H., "Kinematics and Dynamics of Machines", 2nd Ed., McGraw-Hill,ISBN-13: 978-1577662501.	1982
2.	Vinogradov, O., "Fundamentals of Kinematics and Dynamics of Machines and Mechanisms", CRC Press, ISBN 9780849302572.	2000
3.	Massie, H.H., and Reinholtz, C.F., "Mechanisms and Dynamics of Machinery, 4th Ed., John Wiley & Sons, ISBN: 978-0-471-80237-2.	1987
4.	Vicker, J.J., Shigley, J.E., and Pennock, G.R., "Theory of Machines and Mechanisms", 3rd Ed., Oxford University Press,ISBN-13: 978-0195371239.	2003
5.	Hannah, J., and Stephens, R.C., "Mechanics of Machines : Elementary Theory and Examples", 4th Ed., Viva Books, ISBN-10: 0713132329.	2004

BME-C409
STRENGTH OF MATERIALS

MM: 100   Sessional: 30
Time: 3 Hr.   ESE: 70
L T P   Credit : 4
3   1   0

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Deformation in solids- Hooke's law, stress and strain- tension, compression and shear stresses, elastic constants and their relations, volumetric, linear and shear strains, principal stresses and principal planes, Mohr's circle.   **8**

UNIT II

Beams and types of beams, transverse loading on beams, shear force and bending moment diagrams, Types of beam supports, simply supported and over-hanging beams, cantilevers.
Theory of bending of beams, bending stress distribution and neutral axis, shear stress distribution, point and distributed loads.   **10**

UNIT III

Moment of inertia about an axis and polar moment of inertia, deflection of a beam using double integration method, computation of slopes and deflection in beams, Maxwell's reciprocal theorems.**8**

UNIT IV

Torsion, stresses and deformation in circular and hollow shafts, stepped shafts, deflection of shafts fixed at both ends, stresses and deflection of helical springs.**8**

UNIT V

Axial and hoop stresses in cylinders subjected to internal pressure, deformation of thick and thin cylinders, deformation in spherical shells subjected to internal pressure.   **6**

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Bedi, D.S., Strength of Materials, Khanna Publishing, Delhi, ISBN-10: 9382609113.	2013
2.	Rajput, R.K., Strength of Materials, Laxmi Publications, ISBN-10: 9788131808146.	2018
3.	Sadhu Singh, Strength of Materials, Khanna Publication, ISBN-978-81-7409-048-5.	1978
4.	Subramanian R.,Strength of Materials, , Oxford Publications, ISBN-10: 0198061102.	2010
5.	Crandall, S.H., Dahl, N.C., and Lardner, T.J., "An Introduction to the Mechanics of Solids", 2nd Ed., McGraw-Hill, ISBN-10: 0070134413.	1978

BME-C410
PRINCIPLES AND PRACTICES OF MANAGEMENT

MM: 100
Time: 3 Hr
L T P
3 0 0

Sessional: 30
ESE:70
Credit : 3

2.

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Introduction, Relation of Management with other disciplines, Management and Manager, evolution of Management with special emphasis on Scientific management, Introduction of managerial environment and levels of management, Management skills.   **8**

UNIT II

Functions of Management**:** Planning, Decision making, Organization designs, leading and controlling, control systems.   **7**

UNIT III

Introduction of Marketing, Marketing Environment, Target marketing, Marketing Mix, P's of Marketing, Product life cycle.   **8**

UNIT IV

Introduction to Operations Management: Operations Planning and Control, Management of Supply Chain, Introduction to Material Management, Systems and procedures for inventory management.   **9**

UNIT V

Human Behavior: Factors of individual behavior, Perception, Learning and personality development, Interpersonal relationship and Group Dynamics, Training and development.
                  8

Suggested books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Ardalan, A., "Economic and Financial Analysis for Engineering and Project Management", CRC Press	1999
2.	Mondal, S.,"Management: Principles and Practice"Jaico Publishing House; 1 edition , ASIN: B009WPQNXM.	2013
3.	Tripathi, P.C. "Principles of Management" ISBN-10: 9789352605354.	2017
4.	Mahajan,P., "Principles and Practice of Management" ISBN-10: 9352590449.	2017

BKT-A403

BHARTIYA GYAN PARAMPARA

(INDIAN KNOWLEDGE TRADITION)

MM: 100	**Sessional: 30**
Time: 3 Hr.	**ESE: 70**
L T P	**Credit : 0**
2 0 0	

इकाई प्रथम

1- वैदिक एवं लौकिक साहित्य का परिचय एवं उसका उद्देश्य। (वैदिक साहित्य, आर्ष साहित्य एवं स्मृति साहित्य)

2- वैदिक प्रार्थनाएं- गायत्री, भद्रप्राप्ति, शांति, संगठन, सौमनस्य एवं पंच महायज्ञ का सामान्य परिचय।

3- ब्रह्मचर्य महिमा, वैदिक राष्ट्रभक्ति एवं शिव संकल्प। (ब्रह्मचर्य सूक्त- अथर्ववेद 11.5 , पृथ्वी सूक्त- अथर्ववेद 12.1 , शिवसंकल्प सूक्त – यजुर्वेद 34.1-6 में वर्णित विषय वस्तु के आधार पर)

इकाई द्वितीय

1- वैदिक कालीन सामाजिक एवं शिक्षा व्यवस्था।

2- संस्कारों की जीवन में उपयोगिता।

3- पुरुषार्थ चतुष्टय – धर्म, अर्थ, काम, मोक्ष।

इकाई तृतीय

1- त्रैतवाद- ईश्वर, जीव और प्रकृति का स्वरूप।

2- कर्म एवं पुनर्जन्म सिद्धांत। (कर्म, निष्काम कर्म-योग एवं कर्मफल सिद्धांत)

इकाई चतुर्थ

1- मानव जीवन के विकास में योग की महत्ता।

2- अष्टांग योग – यम, नियम, आसन, प्राणायाम, प्रत्याहार, धारणा, ध्यान, समाधि।

इकाई पंचम

1- भारतीय संस्कृति एवं सभ्यता - एक परिचय।

2- ऋषि दयानंद एवं स्वामी श्रद्धानंद का व्यक्तित्व एवं कृतित्व।

3- आर्य समाज की स्थापना, उद्देश्य एवं कार्य। (सामाजिक जनजागरण, अछूतोद्धार, महिला शिक्षा, शुद्धि आंदोलन, सामाजिक कुरीतियों का उन्मूलन, स्वतंत्रता संग्राम में योगदान)

सहायक पुस्तकें—

1. वैदिक साहित्य एवं सस्कृति, डॉ0 कपिल देव द्विवेदी।
2. उपनिषद् दीपिका, डॉ0 रामनाथ वेदालंकार।
3. वैदिकदर्शन, डॉ0 कपिल देव द्विवेदी, विश्वविद्यालय प्रकाशन वाराणसी
4. प्राचीन भारत तथा सामाजिक एवं आर्थिक इतिहास, डॉ0 देवेन्द्र गुप्ता, भारतीय बुक कौपोरेशन नई दिल्ली।
5. योगदर्शन, स्वामी रामदेव, पतंजलि योगपीठ हरिद्वार।
6. सत्यार्थ प्रकाश, स्वामी दयानन्द।
7. आर्यसमाज का इतिहास, डॉ0 सत्यकेतु विद्यालंकार।
8. भारतीय नवजागरण के पुरोधा, डॉ0 भवानी लाल भारतीय
9. संस्कृत साहित्य का इतिहास, डॉ0 कपिल देव द्विवेदी, विश्वविद्यालय प्रकाशन वाराणसी।

BME-C456
FLUID MACHANICS AND FLUID MACHINES LAB

MM: 50   **Sessional: 15**
Time: 2 Hr.   **ESE: 35**
L T P   **Credit: 1**
0 0 2

LIST OF EXPERIMENTS:

1. To measure the surface tension of a liquid.
2. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
3. To determine the coefficients of velocity, contraction and discharge of an orifice (or a mouthpiece) of a given shape. To plot the flow net for a given model using the concept of electrical analogy.
4. To find the velocity distribution in a pipe and hence to compute the discharge by integrating the velocity profile obtained.
5. To verify the Bernoulli's theorem.
6. To calibrate an orifice meter and venturimeter and to study the variation of the coefficient of discharge with the Reynolds number.
7. To calibrate and to determine the coefficient of discharge for rectangular and triangular notches.
8. To verify Darcy's law and to find out the coefficient of permeability of the given medium.
9. To verify the momentum equation.
10. Turbine experiment on Pelton wheel.
11. Turbine experiment on Francis turbine.
12. Turbine experiment on Kaplan turbine.
13. Experiment on Reciprocating pump.
14. Experiment on Centrifugal pump.
15. Experiment on Hydraulic Ram
16. Study through first visit of any pumping station/plant
17. Study through second visit of any pumping station/plant.

NOTE
1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean

BME-C457
MANUFACTURING SCIENCE AND PROCESS LAB

MM: 50   **Sessional: 15**
Time: 2 Hr   **ESE: 30**
L   T   P   **Credit: 1**
0   0   2

LIST OF EXPERIMENTS:
1. Design of pattern for a desired casting (containing hole)
2. Pattern making
3. Making a mould (with core) and casting.
4. Sand testing (at least one such as grain fineness number determination)
5. Injection moulding with plastics
a. Forging hand forging processes
6. Forging - power hammer study & operation
7. Tube bending with the use of sand and on tube bending m/c.
8. Press work experiment such as blanking/piecing, washer, making etc.
9. Wire drawing/extrusion on soft material.
10. Rolling-experiment.
11. Bending & spring back.
12. Powder metallurgy experiment.
13. Jigs and Fixture experiment.

NOTE
1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

BME-C458
THEORY OF MACHINES LAB

MM: 100   **Sessional: 15**
Time: 2 Hr.   **ESE: 35**
L   T   P   **Credit: 1**
002

LIST OF EXPERIMENTS:
1. Study of simple links/models/mechanisms.
2. Study of various commonly used mechanisms and its inversions in machines
3. Study of various types of models of cam and follower arrangements.
4. Study of various models of gear trains arrangements.
5. Experiment on cam and follower apparatus
6. Experiment on Journal bearing apparatus
7. Experiment on critical speed of shaft (whirling of shaft) apparatus
8. Experiment on static Balancing Dynamic Balancing apparatus
9. Experiment on Engine Brakes
10. Experiment on Engine Clutch
11. Experiment on Gyroscope apparatus
12. Experiment on Governor apparatus

NOTE
1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean