II-B.Tech (Sem- II)

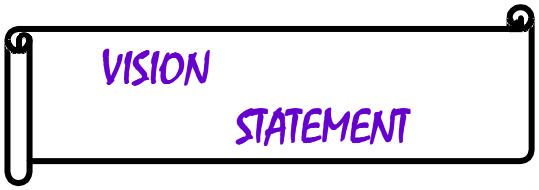
STUDENT HANDBOOK

A.Y.2018-19

Department of Mechanical Engg

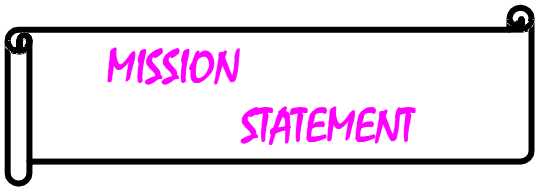
HOLY MARY INSTITUTE OF TECHNOLOGY & SCIENCE

Bogaram (V), Keesara (M), Medchal (Dist)
Hyderabad – 501301, Telangana State
Website: www.hits.ac.in Email: principalhitscoe@gmail.com



VISION STATEMENT OF HITS

To be a premier institute for the study of engineering, technology and management by maintaining high academic standards which promote the analytical thinking and independent judgment among the prime stakeholders enabling them to function responsibly in the globalized society.



MISSION STATEMENT OF HITS

- To impart quality professional education that meets the needs of present and emerging technological world.
- To strive for student achievement and success, preparing them for life and leadership with ethics.
- To provide a scholarly and vibrant learning environment that enables faculty, staff and students achieve personal and professional growth.
- To contribute to advancement of knowledge, in both fundamental and applied areas of engineering, technology & management.
- To undertake research and development works by forging alliances with research institutes, government organizations, industries and alumni and become a center of excellence for quality professional educations and research.

GOALS OF HITS

Goals of engineering education at undergraduate / graduate level:

- Equip students with industry – accepted career and life skills
- To create a knowledge warehouse for students
- To disseminate information on skills and competencies that are in use and in demand by the industry
- To create learning environment where the campus culture acts as a catalyst to student fraternity to understand their core competencies, enhance their competencies and improve their career prospects.
- To provide base for lifelong learning and professional development in support of evolving career objectives, which include being informed, effective, and responsible participants within the engineering profession and in society.
- To prepare students for graduate study in Engineering and Technology.
- To prepare graduates to engineering practice by learning from professional engineering assignments.

Department Objective

To create employable and entrepreneurial engineers with academic excellence, positive attitude,

communication & interpersonal skills, good character, self confidence and leadership qualities and who are useful to the Family, Society and Nation. Also it is aimed for continuous development of faculty personality.

VISION STATEMENT OF DEPARTMENT

To be a world leader and renowned for mechanical engineering and research.

MISSION STATEMENT OF DEPARTMENT

M1: To educate students in undergraduate and post graduate level in basic principles in the field of mechanical engineering.

M2: To train students of different levels to think independently for a self learning habit.

M3: To inculcate a work culture of mastering systematic approach leading to logical thinking and problem solving methodology.

M4: To create keen awareness of the role in leadership skills and managing people in modern society in engineering field.

PROGRAM EDUCATIONAL OBJECTIVES

PEOI	Be successfully employed as a Software Engineer in the field of Information Technology
PEOII	Be a successful entrepreneur and assume leadership position, responsibility within an organization
PEOIII	Progress through advanced degree or certificate programs in engineering, business, and other professionally related fields

PROGRAMME OUTCOMES

PO1	An ability to apply knowledge of computing, mathematics, science, and engineering fundamentals appropriate to the discipline
PO2	Identify, formulate and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics and engineering sciences
PO3	An ability to design and develop solutions for IT Problems to meet desired needs within pragmatic constraints such as economic, environmental, political, manufacturability, and sustainability
PO4	Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5	An ability to use and apply modern technical concepts, tools and practices in the core Information Technologies
PO6	An ability to analyze the local and global impact of computing on individuals, organizations, and society
PO7	An ability to effectively integrate IT-based solutions into the user environment constantly
PO8	An understanding of professional, ethical, legal, security and social issues and responsibilities
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	Ability to communicate effectively with all stake holders
PO11	Apply Project Management skills and knowledge in Practice as a team member/ leader to manage projects
PO12	Recognition of the need for and the ability to engage in Life Long Learning

Our Pioneers...

Dr. A.VARA PRASAD REDDY – CHAIRMAN

To strive and ensure 100% employability to the student community by filling the gap between the students and the requirements of the industry through quality education".

- Graduate in Mechanical Engineering.
- Has been in the field of education from the past 25 years.
- Aim of spreading quality education among children at the school & college level.
- Committed personality with an acute interest in Spreading Technical Education.
- Also the founder chairman of Nalanda Group of Institutions, Guntur, A.P.

Dr. A.VIJAYA SARADA REDDY – SECRETARY

"Nothing is permanent in this world except change. We should change ourselves according to the industry. We mould the students as per the need of the hour. Continuous training & learning will make us always ahead from others".

- Doctorate in Management Studies
- Outstanding personality with a vision of building up the standard and quality Educational Institutions.

I sincerely hope that our students will use the facilities provided to them in our campus and find their profession and justify the trust placed in them by their family, Society and Nation in helping the Country in its march towards becoming a developed Country. Let me take this opportunity to congratulate all departments of our Holy Mary and Nalanda Group of Institutions for their untiring efforts and wish all the students the very best in their attempts to build up purposeful careers for them.

Dr. P. BHASKARA REDDY – DIRECTOR

Dr.P.Bhaskara Reddy, the Director HITS is a and dynamic Professor of ECE, has 30 years of Industry, Teaching, Research and Administrative experience in Reputed Engineering Colleges & Industry. In 28 years of experience served various positions from Asst. Professor to Principal/Director.

Research & Guidance: Published 2 Books 1. "Information Technology in Technical Education – Economic Development by "LAMBERT Academic Publishing" 2. Innovative Methods of Teaching Electronic Devices and Circuits by "Hi Tech Publisher" Published 9 Laboratory Manuals, 126 Research papers at National and International Level journals / Conferences on Education, Electronics Communication, I.T, Computer Networks, E-Commerce etc. Guided 5 Research Scholars for their Doctorates, about 50 M.Tech., M.C.A. and B.Tech projects and completed 2 DST Projects an amount of Rs.72.83 Lakhs.

Symposiums Conducted: 12 National Level Technical Symposiums on various topics in Electronics & Communications, Computers etc.

Awards Received: 1). Bharath Jyothi Award in 2003 from IIFS, New Delhi, 2). Rastraprathiba Award in 2004 from ICSEP, New Delhi, 3). Knowledge Award from Alumni of SVHCE for the year 2001

HOLY MARY INSTITUTE OF TECHNOLOGY & SCIENCE

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited By NAAC 'A' Grade)
Bogaram (V), Keesara (M), Medchal (Dist), Hyderabad, Telangana State

1. GENERAL INFORMATION

ABOUT THE COLLEGE

1.0 BEAUTIFUL CAMPUS

Set in Sylvan surroundings away from the hustle & bustle of city life yet only 4 kms away from Hyderabad – Warangal National Highway (near Ghatkesar), the Institute is extremely conducive to academic, co-curricular and extra-curricular activities. It has large and well ventilated buildings with modern equipment in place and "State of the art", sports facilities.

HIGHLIGHTS:

1.1 *PERFORMANCE*

- Top 13th Rank in Telangana and Top 19th Rank in AP & Telangana and Top 107th Rank in Overall India by The Week Magazine Top 150 Engineering Colleges Ranking 2018 for the A.Y.2018-19.
- Top 04th Rank in Telangana and Top 05th Rank in AP & Telangana and Top 57th Rank in Overall India by Outlook Magazine Top 100 Engineering Colleges Ranking 2018 for the A.Y.2018-19.
- Top 17th Rank in Telangana and Top 27th Rank in AP & Telangana and Top 148th Rank in Overall India by i3RC Times of India Top 150 Engineering Institute Rankings 2018 for the A.Y.2018-19.
- Top 17th Rank in Telangana and Top 33rd Rank in AP & Telangana and Top 153rd Rank in Overall India by India Today Best 165 Engineering Colleges in India Rank 2018 for the A.Y.2018-19.
- Holy Mary Institute of Technology & Science, recognized as Business Incubator (BI) / Host Institute (HI) for implementation of the scheme "Support for Entrepreneurial and Managerial development of SMEs through Incubator" by Ministry of Micro, Small & Medium Enterprises, Govt. of India, New Delhi on 14-03-2018

1.2 *FACULTY*

The College is proud to have the best faculty, a blend of experienced and academics with eminent academicians team IIT's, NIT's and other reputed organizations teaching at the Institute that makes HITS as one of the best Institute pursue B.Tech, M.Tech and MBA as one of the under JNTU Hyderabad. The faculty is constantly encouraged to upgrade their qualifications and a number of them have enrolled for Ph.D.

1.3 *INFRASTRUCTURES*

- Spacious campus and natural surroundings with plenty of greenery
- College Transport facilities from twin cities for students and staff from all corners of the city
- Air Conditioned auditorium for organizing events, workshops and seminars
- Good Canteen facility

- Bank ATM in the campus
- Fully equipped Laboratories with the state-of-art equipment's

1.4 *LABORATORIES*

The Institute has State of the art laboratories with 1000 plus Branded Systems equipped with latest hardware and software with online testing facility catering to the needs of CSE. The Institute also has well equipped ECE, EEE, Civil, Mechanical Engineering Labs and Workshops for Engineering Students.

1.5 *ENGLISH LANGUAGE LABORATORY*

The Institute has established Ultramodern Computerized English language Laboratory with 60 plus Computer Systems loaded with latest Software to enhance the Soft skills of Students to make the Students Industry ready.

The Library also have the previous University Exam Question papers and previous project reports from all the departments. The library contains recorded lectures of all IIT professors from NPTEL.

1.6 *R&D CELL*

The Institute has an R&D Cell under the Chairmanship of Dr.P.Bhaskara Reddy. The R&D cell undertakes externally funded R&D projects from agencies like AICTE, DST, UGC and other similar state, private and society / trust bodies. It also undertakes research publications and interactions of faculty members with outside world.

1.7 *LIBRARY*

The Institute Library has over 49500 books and 150 National and International journals and 15 Magazines that are required to all branches of Engineering. The Institute has the unique distinction of becoming Member of DELNET, Infotrac engineering online journals that connects more than 700 libraries in Asia Pacific Region. The Library has 30 Computers with 10 Mbps, Internet Facility that makes our knowledge Savvy Students to be technically competent on par with Industry professionals. NPTEL Videos and e-books, MIT courses also available.

1.8 *NATIONAL PROGRAMME ON TECHNOLOGY ENHANCED LEARNING (NPTEL)*

The main objective of NPTEL program is to enhance the quality of engineering education in the country by developing curriculum based video and web courses. This is being carried out by seven IITs and IISc Bangalore as a collaborative project. In the first phase of the project, supplementary content for 129 web courses in engineering / science and humanities have been developed. Each course contains materials that can be covered in depth in 60 or more lecture hours. In addition, 110 courses have been developed in video format, with each course comprising of approximately 60 or more one-hour lectures. In the next phase other premier institutions are also likely to participate in content creation.

1.9 *CO-CURRICULAR ACTIVITIES*

The Institution organizes Local Industrial Visits to Organizations like Infosys, CPRI, TSRTC, and to Student Conferences. The Institute focuses on Techno Management Events like Elysium to enhance the Technical Skills and Soft Skills to make them Employable.

1.10 *PROFESSIONAL BODIES*

Holy Mary Institute of Technology & Science has the unique distinction of becoming Institutional Member in Professional bodies such as Confederation of Indian Industry (CII), The Associated Chambers of Commerce of India (ASOCHAM)), Confederation Of Women Entrepreneurs (COWE), Computer Society of India (CSI), Institute of Electronics and Telecommunication Engineering (IETE), Indian Society of Technical Education (ISTE) and Indian Institutions of Production (IIP)

1.11 *EXTRA-CURRICULAR ACTIVITIES*

HITS has State of the art facilities like Olympic Style Basketball Court, Volleyball Court, Gymnasium, Indoor Stadium, Cricket Stadium. HITS has been regularly conducting JNTU Zonal Games and Annual Open Invitational Volleyball, Football, Cricket Tournaments.

The Institute also organizes various Cultural Events like Traditional Day for freshers, "ELYSIUM" A National Level Technical Fest, The Annual Day Celebrations, Farewell Party for final year students, Alumni Meet for Ex. Students and Graduation Day for graduated students every year to imbibe a spirit of Oneness.

A Sense of social responsibility is inculcated in Young Minds by organizing Plantation Programmes, Health Awareness Camps, Blood Donation Camps, Flood Relief Camps and Distribution of Books to School Childrens by HITS NSS Volunteers.

1.12 *IN HOUSE PROJECTS*

The students are taking part in International Project competitions hosted by major MNCs, like IBM, Microsoft and Infosys. The Great Mind Challenge hosted by IBM, Microsoft Imagine Cup and project work as part of foundation programme conducted under the aegis of Infosys are some of the important projects presently being undertaken by the students of HITS. Further, the students are encouraged to do In House Projects under the supervision of expect faculty members. In addition, students are encouraged to give innovative ideas and do projects under the aegis of Microsoft academic innovative alliance.

1.13 *MOUs*

- Ramtech Industries
- Tata Strive
- Bhartiya Skill Development University
- Arrow Constructions
- Techona Enterprises

- Surya Tech Solutions
- EDS Technologies Pvt Ltd
- Seoul National University (Korea)
- Ark Infosolutions Pvt Ltd
- Steinmetz Integrated Learning Solutions Pvt Ltd
- IBM
- Oracle
- Microsoft
- Abigya Training & Consultant
- Ramsys Infocad

For giving special training programmes to engineering students and Faculty members of the institute

1.14 ***STUDENT ACHIEVEMENTS***

- Mr. D Bala Koti student of 3rd year Mechanical has got Rs. 7.00 Lakhs project fund from AICTE-New Delhi and project entitle SAE Baha.
- Mr. D Bala Koti student of 3rd year Mechanical has participated in the workshop on Automobile Engine Mechanics and won Campus Ambassador Award organized by IIT, Hyderabad held on 06th & 07th January 2018.
- Ms. V Veda & Mr. K Vishal students of 3rd year Civil have participated in the event of poster presentation and won 1st prize at Advitiya-2K18 organized by TKR College Engineering & Technology, Hyderabad held on March 2018.
- Mr. V Srikanth Raju, Mr.K Saicharan Reddy, Mr. P Saikiran Reddy, Mr. J Rajashekar Reddy & Mr. D Hari Prasad students of 3rd year ECE have participated and won 1st prize in Utkraanti, A National Level Championship on IOT workshop organized by HITS, Hyderabad held on 27th & 28th February 2018.
- Mr. D Bala Koti student of 3rd year Mechanical has participated and won 3rd prize in Utkraanti, A National Level Championship on IOT workshop organized by HITS, Hyderabad held on 27th & 28th February 2018.
- Ms. A K Keerthi Supraja & Ms.Ayushee students of 2nd year Civil have participated in the event of paper presentation and won 1st prize at National level students Technical Symposium (Tech Samprathi 2018) organized by NREC, Hyderabad held on 05th & 06th January 2018.
- Mr. J Anoop Sai & Mr.K Bharat Kumar students of 2nd year ECE have participated in the event of poster presentation and won 2nd prize at National level Inter College Technical Championship (HAVANA-Trigger Your Skills) organized by GITAM University, Hyderabad held on 19th & 20th December 2017.
- Mr. K Satish, Mr. B Ajay & Mr. M.Vijay students of 4th year EEE have participated in the event of project Expo Competition and won 2nd prize at Prajwalan-2K18 organized by Vignan's Institute of Management & Technology for Women, Hyderabad held on 03rd February 2018.
- Ms. P Chaitanya & Mr. P Mahesh Kumar students of 3rd year EEE have participated in the event of paper presentation and won 1st prize at TechVeda-18 organized by Tirumala Engineering College, Hyderabad held on 19th - 23rd February 2018.
- Mr. M Vijay & Mr. K Satish students of 4th year EEE have participated in the event of Tech Expo and won 1st prize at Reva-2K18 organized by Tirumala Engineering College, Hyderabad held on 19th - 23rd February 2018.
- Mr. B Ajay & Mr. K Satish students of 4th year EEE have participated in the event of

paper presentation and won 1st prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.

- Mr. A Dhanunjay & Mr. P Sandesh students of 2nd year Mechanical have participated in the event of paper presentation and won 1st prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. Y S J Srivathsa & Mr.M.Sai Nikhil students of 2nd year Mechanical have participated in the event of Assembly & Dissembly and won 1st prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. P Yashwanth & Mr.K Sridhar Goud students of 2nd year Mechanical have participated in the event of Assembly & Dissembly and won 2nd prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. M Nuthan Kumar, Mr. A Vikesh & Mr.G Mahesh students of 2nd year Mechanical have participated in the event of Assembly & Dissembly and won 3rd prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. M Aravind student of 2nd year Mechanical has participated in the event of Tools & Part Identification and won 2nd prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. K Ashish Patel & Mr. V Naveen Reddy students of 2nd year Mechanical have participated in the event of paper presentation and won 2nd prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. K Tilak, Mr. Ahmed Humzah & Mr. Rajneesh Kumar Singh students of 2nd year Mechanical have participated in the event of paper presentation and won 3rd prize at Texzellenz-18 organized by Anurag College of Engineering, Hyderabad held on 16th & 17th February 2018.
- Mr. K Satish & Mr. B Ajay students of 4th year EEE have participated in the event of paper presentation and won 1st prize at Prajwalan-2K18 organized by at Vignan's Institute of Management & Technology for Women, Hyderabad held on 03rd February 2018.
- Ms. K Lavanya & Mr. B Prakash students of 4th year ECE have participated in the event of Mehandi Competition and won 2nd prize at Prajwalan-2K18 organized by at Vignan's Institute of Management & Technology for Women, Hyderabad held on 03rd February 2018.
- Ms. U Ashmita student of 3rd year ECE has participated in the event of paper presentation and won 1st prize at Prajwalan-2K18 organized by at Vignan's Institute of Management & Technology for Women, Hyderabad held on 02nd February 2018.
- Mr. D Bala Koti student of 3rd year Mechanical has participated in the workshop organized by IIT, Hyderabad and awaded with appreciation certificate held on 26th & 27th January 2018.
- Mr. P Chaitanya student of 3rd year EEE has participated in the event of paper presentation and won 2nd prize in CSI Brainwaves-2K18 organized by MREC, Hyderabad held on 25th January 2018.
- Our Voleyball team participated and bagged Runners in the sports fest held at Samskruthi Engineering College, Hyderabad.
- Our Voleyball team participated and bagged Runners in the sports fest held at MRCET, Hyderabad on 02nd & 03rd February 2018.
- Our Football team participated and bagged Runners in the sports fest held at MRCET, Hyderabad on 02nd & 03rd February 2018.

- Ms.P.Sandhya student of ECE has participated in the Carrom and bagged 2nd Place in the sports fest held at Vignan's Institute of Management & Technology for Women, Hyderabad.
- Ms.K Anushkala Sinha student of ECE has participated in the Chess and bagged 2nd Place in the sports fest held at Vignan's Institute of Management & Technology for Women, Hyderabad.
- Mr. D Shashank student of 1st year CSE has participated in the event of Telangana 4th senior inter district Sepaktakraw Championship 2017 and won 3rd place organized by Adilabad District Sepaktakraw Association held on 06th & 07th January 2018.

1.15 *ALUMNI OUTREACH*

- The Institute has Alumni Association under the name and Style of HITS Alumni Association and conducted the First Alumni Meet on Feb 2010 at Ramada Manohar Hotel Hyderabad with the batches 0f 2005, 2006, 2007 & 2008 passed out B.Tech & MBA students attending the meet.

- The Association conducted 2nd Alumni meet for B.Tech & MBA students on February 2011 at our college Auditorium.
- The Association conducted 3rd Alumni meet for B.Tech & MBA students on February 2012 at our college Auditorium.
- The Association conducted 4th Alumni meet for B.Tech & MBA students on February 2013 at our college Auditorium.
- The Association conducted 5th Alumni meet for B.Tech, M.Tech & MBA students on February 2014 at our college Auditorium.
- The Association conducted 6th Alumni meet for B.Tech, M.Tech & MBA students on February 2015 at our college Auditorium.
- The Association conducted 7th Alumni meet for B.Tech, M.Tech & MBA students on February 2016 at our college Auditorium.
- The Association conducted 8th Alumni meet for B.Tech, M.Tech & MBA students on February 2017 at our college Auditorium.

1.16 CONTACT INFORMATION

Principal	- Dr.P.Bhaskara Reddy	- 9848511063
Dept. Head Civil	- Dr.M.S.Chauhan	- 7331139087
Dept. Head CSE	- Dr.Ch.V.Raghavendran	- 9848261114
Dept. Head ECE	- Mr.Y.D.Solomon Raju	- 9618111744
Dept. Head EEE	- Mr.S.Radha Krishna Reddy	- 9618111799
Dept. Head Mech	- Dr.B.S.Reddappa	- 9618111877
Dept. Head MBA	- Dr.K.Madhava Rao	- 9963343546
Dept. Head S&H	- Mr. Pratyush Kumar Patnayak	- 9948437913

2. PLACEMENT & HIGHER STUDIES

A separate T & P cell is constituted for career guidance, training & placements. Training programmes in technical, aptitude and soft skills. Several training programmes were conducted for personality development and life skills to make the students industry ready. Holy Mary Institute of Technology & Science is the only institute in Telangana to conduct online & written examination for campus recruitments where more than 35000 students from all over Telangana have taken the recruitment test conducted by MNCs like., Tata Consultancy Services, Infosys, HCL Technologies Ltd, Cognizant Technology Solutions, Mahindra Satyam, iGATE Global Solutions, Mphasis, IBM, Dell and Infotech Enterprises Ltd. The Placement Cell interacted with 156 Companies and placed more than 1000 students for Internships & Placements.

2.1 *INDUSTRY GRADE SKILLS REQUIRED FOR EMPLOYMENT*

Behavioral and Communication Skills are recognized as important elements in professional development of an Engineer including English for specific purposes. Employers give considerable value to these diverse set of skills at the time of interviews.

In addition to course curriculum, every student will gain the following skills during the study period:

- Analytical and Problem solving skills
- Subject – specific knowledge
- Research and improved decision making abilities
- Oral communication skills
- Managerial skills
- Understanding of other cultures
- Confidence and competence to work in International environment

As students are the future leaders, the Responsibility, Accountability and exhibiting the leadership skills should start from the first year of engineering. Every student is advised to read/practice from the following books;

- Verbal and Nonverbal by R S Agarwal
- Baron GRE
- Wren and Martin English Grammar Book

2.2 *IMPORTANT CRITERIA OF EMPLOYMENT*

In addition to the industry grade skills required for employment, the most important criteria for employment is that the student should get a minimum of 60% in academics with no backlogs to make them eligible for campus recruitments. In the recent past, many companies stipulated a cut of 68% for attending the interview / writing the test. Every student should Endeavour to achieve a minimum of 68% with no backlogs to make them suitable for picking up by good companies.

Job Portals:

1. www.freshersworld.com
2. www.monster.com
3. www.naukri.com

2.3 *HIGHER STUDIES M.TECH*

The Graduate Aptitude Test in Engineering (GATE) is an all-India examination administered and conducted in eight zones across the country by the GATE Committee comprising faculty from Indian Institute of Science, Bangalore and seven Indian Institutes of Technology on behalf of the National Coordinating Board - GATE, Department of Education, Ministry of Human Resources Development (MHRD), and Government of India.

Objective

To identify meritorious and motivated candidates for admission to Post Graduate Programmes in Engineering, Technology, Architecture and Pharmacy at the National level. To serve as benchmark for normalization of the Undergraduate Engineering Education in the country.

This provides an opportunity for advanced engineering education in India. An M.E or M.Tech degree is a desirable qualification for our young engineers seeking a rewarding professional career. Engineering students, while in the final year of their degree course, spend considerable time in seeking an opening for studies in foreign universities. The students are advised to pursue M.Tech in IIT's/NIT's/University Colleges.

MBA

Earning a Master's of Business Administration (MBA) degree can provide you with management skills and business expertise that open new career opportunities to you. An MBA program will also launch you into the much higher pay range that upper level managers and executives enjoy. Furthermore, in the high-level positions, an MBA degree will allow you to hold and your work will often be more interesting and rewarding. The students are advised to pursue M.BA in IIM's/XLRI/Reputed Business Schools.

Higher Studies Abroad

TOEFL is mandatory for seeking admission in any academic course at any level-undergraduate, graduate or post graduate, in USA and Canada. Similarly UK Universities ask for IELTS for seeking admission to graduate and past graduate courses.

GRE the Graduate Record Examination (GRE) is administered by the Educational Testing Services (ETS) for admission into all graduate academic programs (except management) in universities across USA and Canada and some selected universities across the world including India. The exam is a Computer Adaptive Test and is administered at any of the Sylvan testing centers in the country after prior registration.

The GMAT is a Computer Adaptive Test administered online by Educational Testing Services (ETS) through Sylvan testing centers located in all the major cities in India. Those who wish to enroll for courses in Business Management in American universities have to take the GMAT test and submit their scores to the department.

2.4 *VARIOUS SCHOLARSHIPS AVAILABLE IN INDIA*

Bharat Petroleum Scholarship For Higher Studies | Balarama Digest Scholarship | Central Institute of Indian Languages | Fair & Lovely Foundation - Project Saraswati Scholarships | Government Of India Office of the Director General of Civil Aviation Scholarship | Homi Bhabha Centre For Science Education Tata Institute of Fundamental Research Research Scholarships | HSBC Scholarships | Indian Council Of Agricultural Research Award Of National Talent Scholarship In Agriculture | Indian Institute Of Geomagnetism Research Scholars | Invention Awards For School Children | Indian Oil Corporation Ltd (IOCL) - Scholarships | Jawaharlal Nehru Memorial Fund Jawaharlal Nehru Scholarships For Doctoral Studies | Junior Research Scholarships For Cancer Biology Tata Memorial Centre & Tata Memorial Hospital | Jaigopal Garodia Vivekananda Trust Scholarships | Lalit Kala Akademi - Scholarship | Mahindra All India Talent Scholarships For Diploma courses In Polytechnics | National Brain Research Centre Scholarships | NTPC Scholarships | National Institute Of Science Communication And Information Resources(NISCAIR) | National Board For Higher Mathematics(NBHM) | National Thermal Power Corporation Ltd.Scholarships | National Olympiad Programme | National Level Science Talent Search Examination - 2005 | Narotam Sekhsaria Scholarship Programme | National Brain Research Centre Scholarships, Post-Doctoral Fellowships | National Aptitude Test | NIIT National IT Aptitude Test | Oil And Natural Gas Corporation Ltd (ONGC) Scholarships To SC/ST Students | Office Of The Director General of Civil Aviation Scholarships Stipend to the SC/ST Candidates | Rashtriya Sanskrit Sansthan - Scholarships | Scholarships To Young Artistes | Saf-Madanjeet Singh Scholarship | Sports Authority Of India - Sports Scholarships | SAF-Madanjeet Singh Scholarship | Spic Macay Scholarships | The Childrens Foundation - Scholarships | The L&T Build-India Scholarship | The Hindu-Hitachi Scholarships | The Paul Foundation Scholarships | Technology Information Forecsting and Assessment Council(TIFAC) Women Scientist Scholarship Scheme | The Young Talent IT Scholarship The Dr.GB Scholarships Foundation |

2.5 *VARIOUS INTERNATIONAL SCHOLARSHIPS AVAILABLE IN INDIA*

A * STAR India Youth Scholarship | A.M.M. Arunachalam-Lakshmi Achi Scholarship For Overseas Study | British Chevening Scholarships | Bharat Petroleum - Scholarships for Higher Studies | Cambridge Nehru Scholarships | Commonwealth Scholarship and Fellowship | Czech Government Scholarship | Chevening Technology Enterprise Scholarship Programme | Chinese Government Scholarship | Greek Government Scholarships | Israel Government Scholarship | Iranian Government Scholarship | Offer of Italian Government Scholarship | Japanese Government Scholarships | K.C.Mahindra Scholarships For Post-Graduate Studies Abroad | Lady Meherbai D.Tata Scholarships | Mexican Government Scholarship | Norwegian Government Scholarships | National Overseas Scholarships/Passage Grant for ST Candidates | Portuguese Government Scholarships | Sophia Merit Scholarships Inc | Slovak Government Scholarship | SIA Youth Scholarships | The Rhodes Scholarships India | The Ramakrishna Mission Institute Of Culture Award of Debesh-Kamal Scholarships For Studies Abroad | The Inlaks Foundation - Scholarships |

Website for Higher Studies:

1. www.higherstudyabroad.org
2. www.highereducationinindia.com

3. STUDENT CAREER ORIENTED PROFESSIONAL CERTIFICATION COURSES

As per the career plan for students of Holy Mary Institute of Technology & Science with a view to bridge the gap between Industry and Academia, it has been planned to equip every student with at least three International / National certification by the time he / she completes the course of study. The details of the certification courses are given below:

Branch	**Year**	**Name of the Certification Course**
Computer Science and Engineering	2nd Year	Certificate Information Technology
	3rd Year	IBM Certified DB2 Database Associate, Infosys Campus Connect
	4th Year	IBM Certified Rational Application Developer
	4th Year	SUN Certified Java Programmer
Electrical and Electronics Engineering	2nd Year	Institute of Electronics and Telecommunication Engineering
	3rd Year	Motorola @ CAMPUS
	4th Year	IBM Certified DB2 Database Associate
Mechanical and Civil Engineering	2nd Year	Certificate in AutoCAD
	3rd Year	Certificate in HighPerMesh
	4th Year	Certificate in CATIA

4. PERFORMANCE MONITORING AND GUIDANCE

4.1 *STUDENT FEEDBACK*

In case the students find it difficult to cope up / understand a particular subject, they are advised to discuss it with

a. The Concerned Teacher
b. The Class Teacher
c. The Department Head
d. The Principal

Students can use the suggestion boxes for communicating feedback. Students should mention their names so that they can be informed of the progress / more details / clarifications can be obtained.

4.2 *CLASS TEACHER*

Every class is assigned a Class Teacher (a faculty member). Students can directly discuss their college related or personal problems related to studies with them. The Class Teachers are accessible to the students and they can talk to the Class Teacher or whenever they are free from class / lab work. Class Teacher will meet with the class representative on daily basis to discuss their day-to-day difficulties if any.

4.3 *CLASS REPRESENTATIVES AND THEIR ROLES*

Two students from each class are selected as the Class Representatives from the department basing on their academic performance and discipline. Department Head makes the selections.

Responsibilities of the Class Representatives:

- Communicating the departmental / college directives & information to the students.
- Collecting the feedback of difficulties faced by the students and communicating Suggestions for improvements.
- Coordinating academic events and co-curricular activities.
- Encourage students to interact for better studies, sharing books and notes.
- Compilation and submission of MIS form to class teacher at the end of the period.

4.4 *PERFORMANCE COUNSELLING*

Mentors will evaluate the student individually for the following:

a. Less marks in internal exams
b. Continuous absence (3 days) and shortage of attendance
c. Not understanding the subject
d. Students from Telugu medium
e. Assistance for back log subjects etc.
f. Communication with parents
g. Provide help to back log students

4.5 *REMEDIAL CLASSES / TUTORIAL / REVISIONS*

Remedial Classes are conducted for students who are weak and who do not perform well in their internal examinations / class tests or for the students who want extra help. Slots in the time table have been reserved for Tutorial where in the students are helped to solve the question in the class itself.

4.6 *BACKLOG MANAGEMENT*

The Mentors maintain a complete record of Examination results of each student and they counsel and guide them in preparing for backlogs. Students are provided with material and important questions are discussed.

4.7 *CORRESPONDENCE WITH PARENTS*

Parents will be informed about the performance of their ward from time to time in the semester. However, parents are requested to be in touch with the Student mentor / Department Head on a regular basis. Further, parents are sent sms on daily bases if their wards do not attend the college.

5. RULES AND REGULATIONS FOR STUDENTS

5.1 *ADMINISTRATIVE*

1. Students, admitted into this College, are deemed to have agreed to the rules and regulations of the college, as laid down by the College Authorities from time to time, and the rules lay down in this leaflet, issued at the time of admission.
2. Students should inform **any changes in the addresses/Phone No.** of their parents / guardians to the college office.
3. The college shall communicate to the parents \ guardians of the students from time to time regarding the regularity and performance in the examinations of their wards. The case of serious indiscipline on the part of the students (s) may also be communicated to parent (s) \ guardian (s).

5.2. ACADEMIC

1. Students should **attend the classes in - time**. Late- comers shall not be permitted to enter the class room and they are likely to **lose the attendance**.
2. Students are expected to be regular to the classes. The students shall not absent themselves for classes without prior approval. **Prior permission** shall be taken from concerned **counselor** and submitted to the **Head of the Department**.
3. In case of **ill-health**, the student should submit the **medical certificate** along with prescription, etc., from a **registered medical doctor**. The student should get the medical certificate within **two days** from the date of reporting to the college after iII health and also produce a **letter from Father/ Mother** regarding ill-health. Permission on medical grounds shall not be granted for one or two days.
4. The students should come to the laboratories with the **prescribed uniform**.
5. If a student **disturbs the class** or makes mischief, he / she will be marked absent and may be **expelled from the class**.
6. Students shall spend their **leisure time** in the library/computer center.
7. Students are expected to put up the **minimum aggregate percentage of attendance (75%)** as laid down by the JNT University. Students, falling short of 75% of attendance shall not be promoted to the next Semester \ Class.
8. Parents \ guardians of the students can contact the college authorities either in person or by post regarding discipline, regularity in attending classes, performance in the examinations, etc., of their wards.

5.3 *DRESS CODE*

1. Students are expected to attend the college **properly dressed**. They should wear the prescribed uniform while attending laboratory classes.
2. Students are expected to **carry the identity cards**, issued by the college, in the campus. They are required to show the identity cards at the library, computer center, office, etc. Students without Identity Cards are not allowed in to the laboratory classes.

5.4 *DISCIPLINE & PUNCTUALITY*

1. No student shall **enter or leave** the class room **without the permission** of the teacher.
2. **Calling students** out of their class rooms while the lecture is in progress is prohibited.

3. Students are required to help in keeping the rooms, buildings, and premises **clean and tidy**. Writing or sticking up of posters and notices on the walls is strictly prohibited.
4. Smoking, Consumption of alcohol, intoxicating drinks or drugs is **strictly prohibited** in and around the college premises. Those indulging in such activities will be put severely or expelled.
5. Students are expected to behave well with the staff, other students and the general public. Any **misbehavior**, coming to the notice of the college authorities, will be severely dealt with.
6. The conduct of the students should be exemplary not only within the premises of the college but also outside. This will help in maintaining the **image and status** of the college.
7. Students are required to **observe silence** at all times in the college campus. They shall not talk in loud tone or call each other by shouting.
8. Students are **prohibited** from loitering in the verandahs / campus during class hours, and sitting on the steps, stair-cases or parapet walls.
9. Students are **not permitted** to resort to strikes and demonstrations within the campus. Participation in such activity entails their dismissal from the college. Any problem they face may be represented to the Counselor / Head of the Department / Principal.
10. Students are **prohibited carrying Cell Phones** and organizing any meeting or entertainment in the college campus without the permission of the college authorities.
11. The entry of **outsiders without permission** is prohibited. Any student found responsible for bringing outsiders into the campus for settling personal disputes with other students, shall be **expelled** from the college.
12. The college is entitled to take any **disciplinary action**, which is deemed necessary in the case of any indiscipline on the part of the students. The same will be reflected on the **Conduct Certificate** issued at the time of leaving the college.
13. No Student Unions, except **Professional Associations**, are **permitted** in the college.
14. If the students cause any **damage to the college property** knowingly or unknowingly individually or in a group they have to pay **5 times to cost of property** damaged them. All the students are collectively responsible for the proper maintenance college property i.e. building, furniture, lab equipment, garden, playgrounds, etc., recovery, calculated on semester to semester basis, will be collected along with examination fee for the semester.

15. Students should keep their **vehicles** only at the **parking place allotted** for the purpose. Vehicle riding in the campus is strictly prohibited.
16. Sitting on the parapet wall and Riding beyond the **parking limits**, the fine will be imposed to Rs.100.00
17. Breakage or loss of equipment /property as decided by the appropriate authority
18. The Principal/Director may, on the recommendation of the Head of the Department, or otherwise, inflict the **following punishments** in the interests of the student discipline and the Institution: fined, curtailment attendance, denial of promotion to next semester, suspension, expulsion or such other action as deemed necessary for the maintenance of discipline in the campus

5.5 *LAB CLASSES*

All students must attend lab classes without fail. Those absent shall follow this procedure laid down in the prescribed format explaining valid reasons and obtain permission to attend the

future classes.

5.6 *FEE*

1. All students admitted into this college, will be required to pay the prescribed tuition fee and other specified fees. Failure of the same will result in the cancellation of admission. No portion of fees will be refunded under any circumstances. If any student wishes to change the college or discontinue the course at any point for any reason, he \ she shall not be permitted to do so unless he \ she pays balance amount of four years fees which he \ she would have to pay, if he \she continued till the completion of the course. His \ Her original certificates including I.e., etc., will be issued only after all the dues as stated above, are cleared by the students. All senior students must pay the college fee every year on or before the 15th of July irrespective of the reopening of the college. If they fail the fine will be imposed as per norms of the management.
2. Miscellaneous fee paid for expenditure related to training programs i.e., technical or soft skills etc., is not refundable.
3. Other than the above, if any fees are levied by the University the student has to be pay the same.

5.7. *TRANSPORT*

All students who are availing the college bus facility must carry the bus-pass and must produce when demanded, failing which they will not allowed traveling in the bus. All students must travel in the allotted bus and routes. They should not change but occupy only their allotted seats throughout. Unauthorized students caught in the bus for not having the bus pass, should pay even if they traveled for one day also. First and second year are not allowed to bring two-wheelers.

5.8. *LIBRARY RULES*

1. Library Books will be issued for 15 days' time and renewal depends upon the demand of the book.
2. Silence should be strictly maintained in the library.
3. Students are responsible for the library borrower card issued to them. Loss of the library card should be reported in writing to the circulation section immediately. Duplicate library borrower card will be issued on payment of Rs.150/- after a week time from the date of application for duplicate cards.
4. The Library borrower card is not transferable.
5. Students shall not make any sort of conversation in any part of the library, causing inconvenience to others.
6. Students shall not bring their belongings inside the library and should keep them outside the library.
7. Students leaving from the library should be checked at the exit.
8. Tearing of pages/stealing of books will invite suspension from using of the library facilities and further disciplinary action will be taken against such students, as per college norms.
9. The borrower shall replace the **new book within 7 days; otherwise, he/she has to pay 3 times of the book cost, along with fine**. In case of loss of book.

5.9. *GENERAL*

1. All the students admitted in this college have to give an **undertaking** to abide by the **rules and regulations** of this college in prescribed format given by the college.
2. All the students **should attend** the college after vacations (Dasara / Sankranthi / Christmas / Semester term / summer) on the **re-opening day** without fail.
3. Students must **deposit all the relevant original certificates and documents** at the time of the admission Office and they will not be returned until completion of the course.
4. Admission of any student can be cancelled by the Management at any point during the course for reasons which are not in consonance with the rules and regulations and which are detrin the reputation of the college.
5. All the Students are here by informed that **college authorities will not take any responsibility** for **loss or theft of your valuable items and money** kept in your bags or somewhere else. Hence we request all the students are not to keep your valuables in class room or anywhere without your presence.
6. **Fee for Issue of Duplicates**

a) Duplicate Hall ticket	Rs. 100.00
b) Duplicate Identity Card	Rs. 100.00
c) Duplicate College Bus Pass	Rs. 50.00
d) Duplicate Study Certificate for same purpose	Rs. 50.00
e) Xerox copies of OD's	Rs. 50.00

All Breakage etc., penalties will be displayed on the Notice Board, and must be paid by the student and no student will be allowed to write examination or internal test or laboratory test, if penalties are not paid by the due date specified in the notice or circular.

5.10. *RAGGING*

Ragging in any form inside or outside the college campus is banned/Prohibited vide Ragging Act 26 of AP. legislative Assembly 1997. Those who indulge in this uncivilized activity are liable for severe disciplinary actions besides being liable for prosecution.

SALIENT FEATURES

Ragging means doing an act which causes or is likely to cause insult 'or annoyance or fear or apprehension or threat or intimidation or outrage of modesty or injury to a student.

S. No.	Nature of Ragging	Punishment
1	Teasing, Embarrassing and Humiliating	Imprisonment Upto 6 Month or Fine Upto Rs 1000/- or Both.
2	Assaulting or using criminal Force or criminal intimidation	Imprisonment Upto 1 Year or Fine Upto Rs 2000/- or Both.
3	Wrongfully restraining or Confining or causing hurt	Imprisonment Upto 2 Years or Fine Upto Rs 5000/- or Both.
4	Causing grievous hurt kidnapping or raping or committing unnatural offence	Imprisonment Upto 5 Years or Fine Upto Rs 10000/- or Both
5	Causing death or abating Suicide	Imprisonment Upto 10 Years or fine Upto Rs. 50000/- or Both

Note:

1. A student convicted of any of the above offences, will be, dismissed from the college
2. A student imprisoned for more than six months for any of the above offences 'will not be admitted in any other College.
3. A student against whom there is prima facie evidence of ragging in any form will be suspended from the college immediately.

Prohibition of Ragging

1. Ragging is prohibited as per act 26 of AP. Legislative assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the college.
4. Outsiders are prohibited from entering the college premises without permission.
5. All students must carry their identity cards and show them when demanded.
6. The principal and staff will visit and inspect the rooms at any time.
7. Suspended students are debarred from entering the campus except when required to attend enquiry and to submit an explanation

TABLE OF CONTENT

S NO	CONTENT	PAGE NO
I	COURSE CALENDAR FOR THE YEAR	
II	II YEAR II SEMESTER COURSE STRUCTURE	
1	MACHINE DRAWING	24-35
	1.1. Course Description	
	1.2. Prerequisite	
	1.3. Marks Distribution	
	1.4. Evaluation Scheme	
	1.5. Course Outcomes	
	1.6. How Program Outcomes are Assessed	
	1.7. JNTUH Syllabus	
	1.8. Course Plan	
	1.9. Mapping Course Objectives Leading to the Achievement of the Program Outcomes	
	1.10.Mapping Course Outcomes Leading to the Achievement of the Program Outcomes	
	1.11.Tutorial Questions	
2	DYNAMICS OF MACHINERY	36-75
	2.1. Course Description	
	2.2. Prerequisite	
	2.3. Marks Distribution	
	2.4. Evaluation Scheme	
	2.5. Course Outcomes	
	2.6. How Program Outcomes are Assessed	
	2.7. JNTUH Syllabus	
	2.8. Course Plan	
	2.9. Mapping Course Objectives Leading to the Achievement of the Program Outcomes	
	2.10.Mapping Course Outcomes Leading to the Achievement of the Program Outcomes	
	2.11. Objective Questions	
	2.12. Tutorial Questions	
	2.13.Assignment Questions	
3	MANUFACTURING PROCESS	76-110
	3.1. Course Description	
	3.2. Prerequisite	

3.3. Marks Distribution
3.4. Evaluation Scheme
3.5. Course Outcomes
3.6. How Program Outcomes are Assessed
3.7. JNTUH Syllabus
3.8. Course Plan
3.9. Mapping Course Objectives Leading to the Achievement of the Program Outcomes
3.10. Mapping Course Outcomes Leading to the Achievement of the Program Outcomes
3.11. Tutorial Questions

4 FLUID MECHANICS AND HYDRAULLIC MACHINES 111-139

4.1. Course Description
4.2. Prerequisite
4.3. Marks Distribution
4.4. Evaluation Scheme
4.5. Course Outcomes
4.6. How Program Outcomes are Assessed
4.7. JNTUH Syllabus
4.8. Course Plan
4.9. Mapping Course Objectives Leading to the Achievement of the Program Outcomes
4.10. Mapping Course Outcomes Leading to the Achievement of the Program Outcomes
4.11. Tutorial Questions

5 Buisness Economics and Financial Analysis 140-160

5.1. Course Description
5.2. Prerequisite
5.3. Marks Distribution
5.4. Evaluation Scheme
5.5. Course Outcomes
5.6. How Program Outcomes are Assessed
5.7. JNTUH Syllabus
5.8. Course Plan
5.9. Mapping Course Objectives Leading to the Achievement of the Program Outcomes
5.10. Mapping Course Outcomes Leading to the Achievement of the Program Outcomes
5.11. Tutorial Questions

SUBJECT NAME: MACHINE DRAWING

1.1 COURSE DESCRIPTION:

Course Code	**ME404ES**			
Course Title	MACHINE DRAWING			
Course Structure	Lectures	Tutorials	Drawings	Credits
	1	1	4	4
Course Coordinator	Mr. Ayub Ashwak Asst Professor			
Team of Instructors	Mr. Adesh bhil, Asst Professor			

COURSE OVERVIEW:

Machine Drawing gives representation of a machine component or machine by lines according to certain set rules. Machine drawing generally gives all the external and internal details of the machine components from which it can be manufactured. The machining symbols, tolerances, bill of material, etc. are specified on the drawing when it is being manufactured, then it is called production drawing. The knowledge of machine drawing helps us in designing the various parts of machine elements. The course content is designed in such a way that the balancing of part drawings (machine components) and assembly drawings

1.2 PREREQUISITES:

Level	Credits	Periods/Weeks	Prerequisites
UG	4	6	Thorough knowledge of Engineering Drawing

1.3 MARKS DISTRIBUTIONS:

Session Marks (25M)	University End Exam Marks	Total Marks
Mid Semester Test There shall be 2 mid-term examinations in a semester. Each midterm examination consists of one subjective paper for 10 marks and 15 marks for day to day work. The average of the two shall be considered for the award of marks for internal test. Subjective paper contains of 4 full questions of which, the student has to answer 2 questions, each question carrying 5 marks. The second mid exams consists of two questions, with first question with internal choice of attempting one out two for 3 marks and second one is compulsory for 7marks. Exam will be completed in 90 min.	75	100

1.4 EVALUATION SCHEME:

S. No.	Component	Duration	Marks
1	I Mid Examination	1 hour and 30 min	10
2	Day to Day Work		15
		TOTAL	**25**
3	II Mid Examination	1 hour and 30 min	10
4	Day to Day Work		15
		TOTAL	**25**
MID Examination marks to be considered as average of above 2 MID's Total			
5	EXTERNAL Examination	3 hours	75
		GRAND TOTAL	**100**

COURSE OBJECTIVES AND OUTCOMES MAPPING TO BLOOMS LEVEL

S.No	Course Objectives	Course Outcomes	Blooms Level
1	I. Understand the different steps in producing drawings according to bureau of Indian standards (B.I.S.) as per SP:46 (1988)	a. After going through this course, the student shall be able to understand the drawings of mechanical components and their assemblies along with their utility for design and development of mechanical System.	BL 1
2	II. Understand the application of industry standards and techniques applied in Machine Drawing	b. Work effectively with engineering and science teams as well as with multidisciplinary Designs.	BL 2
3	III. Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects In two-dimensional views.	c. Skilfully use modern engineering tools and techniques such as CAD- CAM software's for mechanical engineering design, analysis and application	BL 3

BLOOMS LEVEL (BL)

BL 1: Remember / knowledge BL2: Understanding BL3: Apply
BL 4: Analyze BL 5: Evaluate BL 6: Create

1.6 HOW PROGRAM OUTCOMES ARE ASSESSED:

	Program Outcomes	Level	Proficiency assessed by
A	An ability to apply knowledge of mathematics, science, and engineering,	H	Assignments, Exams
B	An ability to design and conduct experiments, as well as to analyze and interpret data,	H	Assignments, Tutorials &
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	Tutorials
D	An ability to function on multidisciplinary teams,	N	--
E	An ability to identify, formulates, and solve engineering problems,	H	Assignments, Tutorials & Exams
F	An understanding of professional and ethical responsibility,	S	Assignments
G	An ability to communicate effectively	S	Assignments, Tutorials & Exams
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context,	S	Tutorials
I	A recognition of the need for, and an ability to engage in life-long learning,	S	Assignments, Tutorials & Exams
J	A knowledge of contemporary issues,	S	Tutorials
K	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	S	Assignments
L	An ability to fit for the reputed core industries requirement (PSPO)	S	Tutorials

N=None S=Supportive H=Highly Related

1.7 MACHINE DRAWING AUTONOMOUS SYLLABUS:

PART -I
MACHINE DRAWING CONVENTIONS

- Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- Title boxes, their size, location and details - common abbreviations and their liberal usage
- Types of Drawings – working drawings for machine parts.

Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportion.

1. Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
2. Keys, cottered joints and knuckle joint.
3. Riveted joints for plates
4. Shaft coupling, spigot and socket pipe joint.
5. Journal, pivot and collar and foot step bearings.

PART-II

Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

1. Steam engine parts – stuffing boxes, cross heads, Eccentrics.
2. Machine tool parts: Tail stock, Tool Post, Machine Vices.
3. Other machine parts - Screws jacks, Petrol engine connecting rod, Plummer block
4. Simple designs of steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1. Machine Drawing by / Bhattacharyya / Oxford
2. Machine Drawing with Auto CAD / Goutham Pohit, Goutam Ghosh / Pearson

REFERENCE BOOKS:

1. Machine Drawing / Ajeet Singh / Mc Graw Hill
2. Machine Drawing / N.D. Bhat / Charotar
3. Machine Drawing –P.S.Gill.
4. Machine Drawing –K.L.Narayana, P.Kannaiah& K.Venkata Reddy / New Age/Publishers

1.8 COURSE PLAN:

At the end of the course, the students are able to achieve the following Course Learning Outcomes.

Lecture No.	Level	Course Learning Outcomes	Topics to be covered	Reference
1	1	**What** is conventional representation Draw the conventional representation of material	Conventional representation of parts such as screws, nuts, Bolts, keys, gears, webs, ribs.	T1 & R4
2	2	**Discuss** the selection of section planes	selection of section planes and drawing of sections and auxiliary sectional views.	T1 & R4
3	4	**Show** the dimension for holes, centres, curved and tapered Features.	Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.	T1 & R4
4	1	**Define** Title boxes, their size, location and details - common abbreviations and their liberal usage	Title boxes, their size, location and details - common abbreviations and their liberal usage	T1 & R4
5	2	**Discuss** the working drawings for Machine parts.	Types of Drawings – working drawings for machine parts.	T1 & R4
6	3	**Show** the Selection of Views like bolts, nuts, stud bolts, tap bolts, set screws. Keys,	Selection of Views, Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.Keys, cottered joints and knuckle joint.	T1 & R4
7	1	**Draw** Riveted joints , Shaft coupling, spigot and socket pipe joint	Rivetted joints for plates, Shaft coupling, spigot and socket pipe joint.	T1 & R4
8	2	**Discuss** about bearing	Journal, pivot and collar and foot step bearings.	T1 & R4
9	3	**Drawing** of assembled parts	Drawings of assembled views 1.Engine parts – stuffing boxes, cross heads, Eccentrics	T1 & R4
10	4	**Show** assembled views Petrol Engine	Drawings of assembled views Petrol Engine connecting rod, piston	T1 & R4

11	2	**Draw** the machine parts - Screws jacks, Machine Vices	Other machine parts - Screws jacks, Machine Vices	T1 & R4
12	2	**Draw** the Plummer block, Tailstock	Plummer block, Tailstock	T1 & R4
13	2	**Draw the** Valves	Valves : Steam stop valve, spring loaded safety valve,	T1 & R4

1.9 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives	Program Outcomes											
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
I	H		S		H		S	S				
II	S								S		S	
III	H	S			H				S		S	

S= Supportive H=Highly Relative

1.10 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

course outcomes	Program Outcomes											
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
a	S											
b									S			S
c	H				H		S					

S= Supportive H=Highly Relative

1.11 OBJECTIVE QUESTIONS:

[C]

1. The ball bearings are provided with a cage [D]
A. To reduce friction
B. To facilitate slipping of balls
C. To prevent the lubricant from flowing out
D. To maintain the balls at a fixed distance apart

2. The number of slots in a 25 mm castle nut is
A.2
B.4
C.6
D.8

3. Screw is said to be over hauling screw, if its efficiency is [B]
A. Less than 50%
B. More than 50%
C. Equal to 50%
D. None of these

4. A transmission shaft includes [D]
A. Counter shaft
B. Line shaft
C. Over head shaft
D. All of these

d.100

5. A locking device in which the bottom cylindrical portion is recessed to receive the tip of the
locking set screw, is called [C]
A. Castle nut
B. Jam nut
C. Ring nut
D. Sawn nut

6. According to indian standard specifications, 100 h6/g5 means that the [B]
A. Actual size is 100 mm
B. Basic size is 100 mm
C. Difference between the actual size and basic size is 100 mm
D. None of the above

7. A column is known as a long column if the slenderness ratio is [D]
A.40
b.50
C.70

8. When screw threads are to be used in a situation where power is being transmitted in one direction only, then the screw threads suitable for this will be [D]

A. Square threads
B. Acme threads
C. Knuckle threads
D. Buttress threads

9. The value of stress concentration factor depends upon [C]
A. Material of the part
B. Geometry of the part
C. Material and geometry of the part
D. None of these

10. When a bolt is subjected to shock loading, the resilience of the bolt should be considered in order to prevent breakage at the [C]
A. Head
B. Shank
C. Thread
D. Middle

11. In unilateral system of tolerance, the tolerance is allowed on [B]
A. One side of the actual size
B. One side of the nominal size
C. Both sides of the actual size
D. Both sides of the nominal size

12. Which of the following material has the maximum ductility? [A]
A. Mild steel
B. Copper
C. Zinc
D. Aluminum

13. The pipe joint mostly used for pipes carrying water at low pressures is [A]
A. Socket joint
B. Nipple joint
C. Union joint
D. Spigot and socket joint

14. Surface endurance limit of gear material is dependent upon its [C]
A. Elastic strength
B. Yield strength
C. Brinell hardness number
D. Toughness

15. A flanged pipe joint will be a leak-proof joint, if the circumferential pitch of the bolts is (where d = diameter of bolt hole) [C]
A. Less than 20 d
B. Greater than 30 d
C. Between 20 d and 30 d
D. Equal to inside diameter of pipe

16. The load cup of a screw jack is made separate from the head of the spindle to [C]
A. Enhance the load carrying capacity of the jack
B. Reduce the effort needed for lifting the working load
C. Prevent the rotation of load being lifted
D. Reduce the value of frictional torque

17. The rolling contact bearings are known as [D]
A. Thick lubricated bearings
B. Plastic bearings
C. Thin lubricated bearings
D. Antifriction bearings

18. The size of a gear is usually specified by [B]
A. Pressure angle
B. Pitch circle diameter
C. Circular pitch
D. Diametric pitch

19. The taper on cotter varies from [D]
A.1 in l5 to 1 in 10
B.1 in 24 to 1 in 20
C.1 in 32 to 1 in 24
D.1 in 48 to 1 in 24

20. which of the following screw thread is used for power transmission in one direction only? [C]
A. Acme threads
B. Square threads
C. Buttress threads
D. Multiple threads

21. The railway carriage couplings have [D]
A. Square threads
B. Acme threads
C. Knuckle threads
D. Buttress threads

22. When a bolt is subjected to an external load, the stress induced in the bolt will be [D]
A. Tensile stress
B. Shear stress
C. Combined tensile and shear stress
D. Any one of these

23. The included angle for the British standard whit worth thread is [C]
A.29°
B.47.5°
C.55°
D.60°

24. The strength of a riveted joint is equal to [D]
A. Tearing strength of plate (pt)
B. Shearing strength of rivet (ps)
C. Crushing strength of rivet (pc)
D. Least value of ptps and pc

25. The ball bearings are, usually, made from [C]
A. Low carbon steel
B. High carbon steel
C. Medium carbon steel
D. High speed steel

26. A coupling used to connect two perfectly aligned shafts, is [D]
A. Muff coupling
B. Compression coupling
C. Flange coupling
D. All of these

1.12 ASSIGNMENT QUESTION:

S. No	Question	Blooms Taxonomy Level	Course Outcome
1	Sektch the conventional representation of the following materials:(a).Metals, (*b*).Glass, (c) Packing (*d*).Insulating material (e).Liquids, (*f*). Wood, (g).Concrete	Application, Synthesis	a
2	Sketch the conventional representation of the following: (*a*)Splined shafts (*b*) Interrupted (*c*) leaf spring with eyes, (*d*) Cylindrical compression spring, (e)Cylindrical tension spring	Application	a
3	Sketch the conventional representation of the following: (a).Spur gear and (b) helical gear.(c).Bevel gear (d) Worm wheel (e) Worm and (f).Straight knurling	Application	a
4	Sketch the following thread profiles for a pitch 30 mm and give their applications: (a).BSW thread, (*b*) Buttress thread (*c*) Square thread,(*d*) ACME thread and (*e*) Worm thread.	Comprehension, Application	b
5	Give the proportions of a hexagonal nut, in terms of the nominal diameter of the bolt of 20 mm.	Application	a
6	Draw the three views of a hexagonal headed bolt of nominal diameter 25 mm and length 100 mm; with a hexagonal nut and washer.	Comprehension, Application	a
7	Following foundation bolts of diameter 25 mm: (a).eye foundation bolt, **(b).** Bent foundation bolt, (c). Rag foundation bolt and (*d*) Lewis foundation bolt.	Comprehension, Application	c

8	Draw the sectional view from the front, and view from the side of a cotter joint with sleeve used to connect two rods of 30 mm diameter each.	Comprehension, Application	a
9	Draw the half sectional view from the front, with top half in section and the view from the side of a cotter joint with socket and spigot ends, to connect two rods of 30 mm diameter each.	Application, Synthesys	c
10	Draw the half sectional view from the front, with top view knuckle joint , to connect two rods of 30 mm diameter each	Comprehension, Application	a
11	Sketch the sectional view from the front and view from the side of a butt- muff coupling; indicating proportions for connecting two shafts, each of diameter 30 mm.	Application	b
12	Draw (*a*) half sectional view from the front, top half in section and (*b*) half sectional view from the side, left half in section, of a split-muff coupling, indicating proportions to connect two shafts, each of diameter 50 mm.	Comprehension, Application	a
13	Draw (*a*) half sectional view from the front, top half in section and (*b*) view from the side of a rigid flange coupling to connect two shafts, each of diameter 30 mm	Comprehension, Application	a
1	Draw (*a*) half sectional view from the front, top half in section and (*b*) view from the side of a bushed pin type flange coupling, indicating proportions to connect two shafts, each of diameter 30 mm.	Comprehension, Application	a
15	Draw (*a*) sectional view from the front and (*b*) view from the side of a universal coupling, indicating proportions, to connect two shafts, each of diameter 30 mm.	Application, Synthesis	a
16	Sketch the required views of (*a*) ldham coupling and (*b*) cushion coupling, indicating proportions, used to connect two shafts, each of diameter 30 mm.	Application	a
17	Draw the following views of a plummer block, suitable for supporting a shaft of diameter 50mm: *(a)* half sectional view from the front, with left half in section, *(b)* sectional view from the side, and view from above.	Comprehension, Application	b
18	Sketch the necessary views of a foot-step bearing, for supporting a shaft of diameter 50mm. Give all important proportionate dimensions.	Comprehension, Application	a
19	Giving proportionate dimensions, sketch any four forms of commonly used rivet heads, choosing the rivet diameter as 10 mm.	Comprehension, Application	c
20	Draw (*a*) sectional view from the front and (*b*) view from above, of the following riveted joints, to join plates of thickness 10 mm: (i).Single riveted lap joint, (*ii*) double riveted chain lap joint, (*iii*) double riveted zig- zag lap joint,	Application, Synthesis	a

SUBJECT NAME: Dynamics of Machinery

COURSE DESCRIPTION:

Course Code	**ME403ES**			
Course Title	**DYNAMICS OF MACHINERY**			
Course Structure	Lectures	Tutorials	Practicals	Credits
	4	1	-	4
Course Coordinator	Dr. B S Reddappa, Professor			
Team of Instructors				

COURSE OVERVIEW:

The objective is to introduce some of the components mainly used in IC Engines and make analysis of various forces involved. Subjects deals with topics like inertia forces in slider crank mechanism; IC Engine components & the analysis like governors is introduced. It also deals with balancing of rotating & reciprocating parts. Studies are made about balancing of multi cylinder engines, Radial engines etc. study of primary & secondary forces are considered while balancing. Finally they are introduced to the topic of vibrations. The study deals with linear, longitudinal, & torsional vibrations. The idea is to introduce the concept of natural frequency and the importance of resonance and critical speeds. After completion of this course the **student's gains adequate knowledge either** to work in design and development of engines components, manufacturing and maintenance sector of mechanical engineering.

PREREQUISITES:

Level	Credits	Periods/Weeks	Prerequisites
UG	4	4	Engineering Mechanics, Mechanics of solids, Kinematics of Machinery, Thermodynamics

COURSE OBJECTIVES vs COURSE OUTCOMES

Sl. No.	Course Objectives	Course Outcomes	Blooms Level
1	To understand the basic principles of dynamics	Able to explain the basic terms and principles of statics and dynamics	
2	To understand basic analysis mechanism and gyroscope	Analysis and balance the static and dynamic equilibrium of single slider crank mechanism and four bar mechanism by the understanding principle of equilibrium. Analysis on gyroscopic effect on aeroplane, ship and auto motive vehicle.	

3	To design of turning moment diagrams and flywheel	To calculate fluctuation of energy of various engines and design of turning moment diagrams and flywheel. Understanding the importance of turning moment diagrams, fly wheels and governors its analysis	
4	An ability to derive frictional forces on bodies in motion by applying knowledge of mathematics and mechanics. An ability to design, formulate, and solve engineering problems on clutches and brakes .	Define and derive the types of friction. Understanding of the concepts of friction-clutches, brakes and dynamometers and its importance.	
5	To understand governors and their types An ability to balance both the rotating and reciprocating masses.	Able to explain difeerent types governor and demonstrate. To analysis static and dynamic Balancing of rotating and reciprocating masses in same plane and different plane	
6	An ability to study the vibrations of beams and springs when masses are attached	Understanding of the concepts of vibrations and simple problems on forced damped vibrations.	

BLOOMS LEVEL (BL)
BL 1: Remember / knowledge BL2: Understanding BL 3: Apply
BL 4: Analyze BL 5: Evaluate BL 6: Create

JNTUH SYLLABUS

DYNAMICS OF MACHINERY

UNIT – I

Precession: Gyroscopes – effect of precession – motion on the stability of moving vehicles such as motorcycle – motorcar – aeroplanes and ships.

Static and Dynamic Force Analysis: Static force analysis of planar mechanisms – Analytical Method – Dynamic Force Analysis – D'Alembert's principle, Dynamic Analysis of 4-link mechanism, Slider Crank Mechanism.

UNIT – II

Turning Moment Diagram And Flywheels: Engine Force Analysis – Piston Effort, Crank Effort, etc., Inertia Force in Reciprocating Engine – Graphical Method - Turning moment diagram –fluctuation of energy – flywheels and their design - Inertia of connecting rodinertia force in reciprocating engines – crank effort and torque diagrams.

UNIT – III

Friction: pivots and collars – uniform pressure, uniform wear – friction circle and friction axis: lubricated surfaces – boundary friction – film lubrication. Clutches – Types – Single plate, multi-plate and cone clutches.

Brakes And Dynamometers: Types of brakes: Simple block brake, band and block brake internal expanding shoe brake-effect of braking of a vehicle. Dynamometers – absorption and transmission types. General description and methods of operation.

UNIT – IV

Governors: Types of governors - Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung with auxiliary springs. Sensitiveness, isochronisms and hunting – stability – effort and power of the governors.

Balancing : Balancing of rotating masses- Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples. Examination of "V" and multi cylinder in-line and radial engines for primary and secondary balancing- locomotive balancing – Hammer blow – Swaying couple – variation of tractive effort.

UNIT – V

Vibrations: Free Vibration of mass attached to vertical spring – Transverse loads – vibrations of beams with concentrated and distributed loads. Dunkerly's method – Raleigh's method. Whirling of shafts – critical speed – torsional vibrations – one, two and three rotor systems.

Text Books:

1. Theory of Machines /S.S.Rattan / Mc Graw Hill.
2. Theory of Machines /Sadhu Singh/ Pearson

Reference Books:

1. Theory of Machines and Mechanisms/Joseph E. Shigley / Oxford
2. Theory of Machines / Rao,J.S / New Age.

COURSE PLAN:

At the end of the course, the students are able to achieve the following Course Learning Outcomes.

Lecture No.	Blooms level	Course learning outcomes	Learning Objective	Topics	Reference
1	L1	a	To understand the concept of Gyroscopes	**Precession:** Gyroscopes – effect of precession –	T1,R1
2	L1	a		**Precession:** Gyroscopes and their Applications **(Video Presentation)**	https://www.youtube.com/watch?v=cquvA_IpEsA
3	L2	a	To understand the effect of gyro couple on automobiles and find the reaction forces	motion on the stability of moving vehicles - motorcycle (Problems)	T1,T2,R1,R2
4	L5	a		motion on the stability of moving vehicles - motorcar(Problems)	T1,R1
5	L5	a		motion on the stability of moving vehicles - aeroplanes (Problems)	T1,T2,R1,R2
6	L2	a		motion on the stability of moving vehicles - ships(Problems)	T1,R1
7	L3	a	To understand the concept of Static and Dynamic Force Analysis	**Static and Dynamic Force Analysis:** Static force analysis of planar mechanisms	T1,T2,R1,R2
8	L2	a		Analytical Method	T1,R1
9	L3	a		**Static and Dynamic Force Analysis (Video Presentation)**	https://www.youtube.com/watch?v=xrEwN3Z_oGw
10	L4	b	To understand of D'Alembert's principle Applications of 4-link mechanism Applications of Slider Crank Mechanism.	Dynamic Force Analysis – D'Alembert's principle	T2,R2
11	L4	b		Dynamic Analysis of 4-link mechanism,	T1,T2,R1,R2
12	L3	b		Dynamic Analysis of Slider Crank Mechanism.	T2,R2
13 - 15	L6	b	To analyze different forces on Connecting rod.	**Turning Moment Diagram And Flywheels:** Engine Force Analysis – Piston Effort, Crank Effort, etc	T1,R1
	L1	b		**Turning Moment Diagram And Flywheels: (Video Presentation)**	https://www.youtube.com/watch?v=swgvKwyOnYk
16-19	L6	b		Inertia Force in Reciprocating Engine – Graphical Method	T1,T2,R1,R2
20-21	L2	b	Procedure to design Flywheel	Turning moment diagram –fluctuation of energy – flywheels and their design	T1,T2,R1,R2
22-24	L5	c	To plot graph	Inertia of connecting rod inertia force	T1,T2,R1,R2

			between crank effort and crank angle	in reciprocating engines – crank effort and torque diagrams	
25	L3	c	Applications of frictional forces. To solve the problems	**Friction:** pivots and collars – uniform pressure, uniform wear	T1,R1
26	L6	c		**Friction (Video Presentation)**	https://www.youtube.com/watch?v=fo_pmp5rtzo
27	L2	c	To understand Frictional forces on journal bearings & To understand Frictional forces on lubricated surfaces	friction circle and friction axis: lubricated surfaces – boundary friction – film lubrication.	T2,R2
28	L6	c	To learn the principle of clutches and its working with the distribution of forces	Clutches – Types –	T1,R1
29	L5	c		**Clutches (Video Presentation)**	https://www.youtube.com/watch?v=pqF-aBtTBnY
30	L1	d		Single plate, multi-plate and cone clutches.	T1,R1
31-33	L2	d	To apply mathematical principles for resolving frictional forces in brakes and understand different types of brakes	**Brakes And Dynamometers:** Types of brakes: Simple block brake, band and block brake, internal expanding shoe brake, effect of braking of a vehicle.	T2,R2
34	L5	d		**Brakes And Dynamometers (Video Presentation)**	https://www.youtube.com/watch?v=bSgbhom_SVE&list=PL4K9r9dYCOorRH0aqVk_6tO8ilRPjVMyC
35	L5	d	To understand different methods to determine the power of a machine	Dynamometers – absorption and transmission types	T1,R1
36	L2	d		General description and methods of operation.	T2,R2
37	L5	d	To understand the working of Governors and to analyze the forces.	**Governors:** Types of governors -	T1,R1
38	L2	e		**Governors (Video Presentation)**	https://www.youtube.com/watch?v=HS_YGZXP2xY

39	L2	e		Watt, Porter and Proell governors.	T2,R2
40	L6	e		Spring loaded governors – Hartnell and Hartung with auxiliary springs.	T1,R1
41	L2	e		Sensitiveness, isochronisms and hunting	T1,R1
42	L2	e		Stability – effort and power of the governors.	T2,R2
43	L3	e	To analyze the forces and to balance the masses on crank shaft. To analyze the forces and to balance the masses on reciprocating masses.	**Balancing :** Balancing of rotating masses-	T1,R1
44	L3	e		**Balancing (Video Presentation)**	https://www.youtube.com/watch?v=ChN6yUzgBbs
45	L3	e		Primary, Secondary, and higher balancing of reciprocating masses.	
46	L2	e		Analytical and graphical methods. Unbalanced forces and couples.	T2,R2
47	L2	e		Examination of "V" and multi cylinder in-line and radial engines for primary and secondary balancing	T1,R1
48	L5	e		locomotive balancing – Hammer blow – Swaying couple – variation of tractive effort.	T2,R2
49 -50	L3	e	To learn the concept of masses and their vibrations in different bodies.	**UNIT – V** **Vibrations:** Free Vibration of mass attached to vertical spring	T1,R1
	L3	e		**Vibrations(Video Presentation)**	https://www.youtube.com/watch?v=tJNaPt5aPmg
51-52	L2	e		Transverse loads – vibrations of beams with concentrated and distributed loads.	T1,R1
53-54	L2	e	To apply Mathematical methods to know the vibrations.	Dunkerly's method – Raleigh's method.	T2,R2
55-56	L3	e	To learn the concept of masses and their vibrations in different bodies.	Whirling of shafts, critical speed	T2,R2
57-60	L5	e		Torsional vibrations, one, two and three rotor systems.	T1,R1

MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objectives	A	B	C	D	E	F	G	H	I	J	K	L	M	N
I	H	S	H	S	H			S	H			S		H
II	H	S	S	S	H			S	H			S	S	H
III	H	H	S	S	H		S	S	H			S	S	H
IV	H	S	H	S	H		S	H	H			S	S	S
V	H	S	S	H	S			S	S	H		S	S	H

S= Supportive **H=Highly Relative**

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes	A	B	C	D	E	F	G	H	I	J	K	L	M	N
a	S	S	S	S				H	S			S		H
b	S	S	S	H	S			H	H			S	S	H
c	H	S	S	H	S		S	S	S			S	S	H
d	S	S	S	H				S	S			S	S	S
e	S	S	H	S	H			S	S			S	S	S

S= Supportive **H=Highly Relative**

Objective Questions

Unit 1

Choose the best answer

1. A disc spinning on its axis at 20 rad/s will undergo precession when a torque 100 N-m is applied about an axis normal to it at an angular speed, if mass moment of inertia of the disc is the 1 kg-m2 **[b]**
   (*a*) 2 rad/s (*b*) 5 rad/s (*c*) 10 rad/s (*d*) 20 rad/s
2. The engine of an aeroplane rotates in clockwise direction when seen from the tail end and the aeroplane takes a turn to the left. The effect of the gyroscopic couple on the aeroplane will be **[a]**
   (*a*) to raise the nose and dip the tail (*b*) to dip the nose and raise the tail (*c*) to raise the nose and tail (*d*) to dip the nose and tail
3. The air screw of an aeroplane is rotating clockwise when looking from the front. If it makes a left turn, the gyroscopic effect will **[b]**
   (*a*) tend to depress the nose and raise the tail (*b*) tend to raise the nose and depress the tail (*c*) tilt the aeroplane
   (*d*) none of the above
4. The rotor of a ship rotates in clockwise direction when viewed from the stern and the ship takes a left turn. The effect of the gyroscopic couple acting on it will be **[c]**
   (*a*) to raise the bow and stern (*b*) to lower the bow and stern (*c*) to raise the bow and lower the stern
   (*d*) to lower the bow and raise the stern
5. When the pitching of a ship is upward, the effect of gyroscopic couple acting on it will be **[b]**
   (*a*) to move the ship towards port side (*b*) to move the ship towards star-board (*c*) to raise the bow and lower the stern (*d*) to raise the stern and lower the bow
6. In an automobile, if the vehicle makes a left turn, the gyroscopic torque **[a]**
   (*a*) increases the forces on the outer wheels (*b*) decreases the forces on the outer wheels (*c*) does not affect the forces on the outer wheels (*d*) none of the above
7. A motor car moving at a certain speed takes a left turn in a curved path. If the engine rotates in the same direction as that of wheels, then due to the centrifugal forces **[b]**
   (*a*) the reaction on the inner wheels increases and on the outer wheels decreases
   (*b*) the reaction on the outer wheels increases and on the inner wheels decreases
   (*c*) the reaction on the front wheels increases and on the rear wheels decreases
   (*d*) the reaction on the rear wheels increases and on the front wheels decreases
8. When the crank is at the inner dead centre, in a horizontal reciprocating steam engine, then the velocity of the piston will be **[a]**
   (*a*) zero (*b*) minimum (*c*) maximum
9. A rigid body, under the action of external forces, can be replaced by two masses placed at a fixed distance apart. The two masses form an equivalent dynamical system, if **[d]**
   (*a*) the sum of two masses is equal to the total mass of the body
   (*b*) the centre of gravity of the two masses coincides with that of the body
   (*c*) the sum of mass moment of inertia of the masses about their centre of gravity is equal to the mass moment of inertia of the body
   (*d*) all of the above
10. The essential condition of placing the two masses, so that the system becomes dynamically equivalent is **[a]**
    (a) $l1 \,.l2 = kG^2$ (*b*) $l1 \,.l2 = kG$ (*c*) $l1 = kG$ (*d*) $l2 = kG$

Fill in the blanks

1. In an engine, the work done by inertia forces in a cycle is---------- (positive)
2. In a reciprocating steam engine, which of the following forms a kinematic link ?
   (crank shaft and flywheel)
3. The motion of a piston in the cylinder of a steam engine is an example of --------
   (completely constrained motion)
4. The motion transmitted between the teeth of gears in mesh is----------
   (partly sliding and partly rolling)
5. The cam and follower without a spring forms a---------- (self closed pair)
6. A ball and a socket joint forms a---------- (spherical pair)
7. The lead screw of a lathe with nut forms a---------- (screw pair)
8. When the elements of the pair are kept in contact by the action of external forces, the pair is said to be a----------(force closed pair)
9. Which is the a turning pair ?----------
   (Shaft with collars at both ends fitted in a circular hole)
10. A combination of kinematic pairs, joined in such a way that the relative motion between the links is completely constrained, is called a ---------- (kinematic chain)

Unit 2

Choose the best answer

1. The maximum fluctuation of energy is the **[b]**
   (*a*) sum of maximum and minimum energies
   (*b*) difference between the maximum and minimum energies
   (*c*) ratio of the maximum energy and minimum energy
   (*d*) ratio of the mean resisting torque to the work done per cycle
2. In a turning moment diagram, the variations of energy above and below the mean resisting torque line is called **[a]**
   (*a*) fluctuation of energy (*b*) maximum fluctuation of energy
   (*c*) coefficient of fluctuation of energy (*d*) none of the above
3. The ratio of the maximum fluctuation of speed to the mean speed is called
   (*a*) fluctuation of speed (*b*) maximum fluctuation of speed **[c]**
   (*c*) coefficient of fluctuation of speed (*d*) none of these
4. The ratio of the maximum fluctuation of energy to the, ... is called coefficient of fluctuation of energy. **[b]**
   (a) minimum fluctuation of energy (*b*) work done per cycle

5. The radius of gyration of a solid disc type flywheel of diameter 'D' is **[b]**
   a. D b. D/2 c. D/√2 d. (√3/2)D
6. With usual notations for different parameters involved, the maximum fluctuations of energy for a flywheel is given by **[a]**
   a. 2ECS b. ECS/2 c. 2ECS2 d. 2E2CS
7. Turning moment diagram is a graph between **[a]**
   a. Torque and Crank angle b. Torque and crank radius
   c. Force and crank radius d. none of the above
8. Mean resisting torque in Turning Moment diagram is given by **[a]**
   a. Work done per cycle/Angle turned during the cycle
   b. Work done per cycle x Angle during the cycle
   c. Work done per revolution /Angle during the cycle
   d. None of the above
9. The energy is stored in Flywheel in form of **[b]**
   a. Potential energy b. Kinetic energy c. Heat energy d. Electrical energy
10. The radius of Gyration (k) for Rim Type Flywheel having radius 'r' is given by **[c]**
    a. k = 2r b. k=r/2 c. k=r d. k=r/3

Fill in the blanks

1. The coefficient of fluctuation of speed of Flywheel is given by ----------(N1-N2)/N
2. The Coefficient of fluctuation of energy of flywheel is given as----------
   (Emax – Emin)/Work done per cycle
3. The coefficient of fluctuation of speed is the _____ of maximum fluctuation of speed and the mean speed.(ratio)
4. In a turning moment diagram, the variations of energy above and below the mean resisting torque line is called---------- (fluctuation of energy)
5. The ratio of the maximum fluctuation of energy to the ……. is called coefficient of fluctuation of energy. (workdone per cycle)
6. Due to the centrifugal force acting on the rim, the flywheel arms will be subjected to---------- (tensile stress)
7. The cross-section of the flywheel arms is usually---------(elliptical)
8. The diameter of the hub of the flywheel is usually taken--------(twice the diameter of the shaft)
9. In order to find the maximum bending moment on the arms, it is assumed as a----------
(cantilever beam fixed at the hub and carrying a concentrated load at the free end of the rim)
10. If E = Mean kinetic energy of the flywheel, CS = Coefficient of fluctuation of speed and Δ E = Maximum fluctuation of energy, then----------($\Delta E = 2 E \times CS$)

Unit 3

Choose the best answer

1. The angle of inclination of the plane, at which the body begins to move down the plane, is called **[a]** (*a*) angle of friction (*b*) angle of repose (*c*) angle of projection
2. The frictional torque transmitted by a disc or plate clutch is same as that of **[b]**
   (*a*) flat pivot bearing (*b*) flat collar bearing
   (*c*) conical pivot bearing (*d*) trapezoidal pivot bearing
3. The frictional torque transmitted by a cone clutch is same as that of **[d]**
   (*a*) flat pivot bearing (*b*) flat collar bearing
   (*c*) conical pivot bearing (*d*) trapezoidal pivot bearing
4. The brakes commonly used in railway trains is **[a]**
   (a) shoe brake (*b*) band brake (*c*) band and block brake (*d*) internal expanding brake
5. The brake commonly used in motor cars is **[d]**
   (a) shoe brake (*b*) band brake (*c*) band and block brake (*d*) internal expanding brake
6. When brakes are applied to all the four wheels of a moving car, the distance travelled by the car before it is brought to rest, will be **[b]**
   (a) maximum (*b*) minimum
7. Which of the following is an absorption type dynamometer ? **[a,b]**
   (*a*) prony brake dynamometer (*b*) rope brake dynamometer
   (*c*) epicyclic-train dynamometer (*d*) torsion dynamometer
8. The energy absorb by brake is always kinetic. **[b]**
   a) No, potential
   b) Kinetic or potential
   c) Potential
   d) Strain Energy
9. Pneumatic brakes are same as electrical brakes. **[b]**
   a) Yes both are concerned with electricity
   b) No, one deals with pressure and other with electricity
   c) Yes both deals with pressure
   d) None of the listed
10. A solid cast iron disk of mass 1000kg is rotating at 350rpm. Diameter of the disk is 1m and time taken to come to stop the disk by brake is 1.6sec.Calculate energy absorbed by the brake if

square of radius of gyration is 0.2. **[b]**
a) None of the mentioned
b) 134.3kJ
c) 165.3kJ
d) 134.2kJ

Fill in the Blanks

1. A solid cast iron disk of mass 1000kg is rotating at 350rpm. Diameter of the disk is 1m and time taken to come to stop the disk by brake is 1.6sec.Square of radius of gyration is 0.2. Calculate the average angular velocity during braking period.------- (18.32rad/s)
2. A solid cast iron disk of mass 1000kg is rotating at 350rpm. Diameter of the disk is 1m and time taken to come to stop the disk by brake is 1.6sec.Square of radius of gyration is 0.2. Calculate the angle through which disk rotated during braking period.--------(29.3rad)
3. A solid cast iron disk of mass 1000kg is rotating at 350rpm. Diameter of the disk is 1m and time taken to come to stop the disk by brake is 1.6sec.Square of radius of gyration is 0.2. Calculate the torque capacity of the brake.--------(4583.6N-m)
4. An automobile brake is only used to reduce the speed or bring the vehicle to hault------ (No, it also be used to hold the car)
5. The Fluid clutch is not a Friction clutch----------(yes)
6. Dog clutch is known as positive clutch--------(yes)
7. The Semi-centrifugal clutch type of arrangement is used in synchromesh type gear box---(No – Dog clutch)
8. The torque which a clutch can transmit, depends upon the----------(coefficient of friction, spring force, contact surfaces)
9. In Disc clutch, the clutch disc acts as a----------(driven member)
10. In Disc clutch, engine flywheel acts as a----------(driving plate)

Unit 4

Choose the best answer

1. Which of the following conditions should be satisfied for static balancing? **[b]**

   1. Dynamic forces acting on the system should be zero
   2. Couple acting on the system due to dynamic force should be zero
   3. Centrifugal forces acting on the system should be zero
   4. Couple acting on the system due to centrifugal forces should be zero

   a. Condition 1 and condition 2
   b. Condition 1 and condition 3
   c. Condition 3 and condition 4
   d. All of the above
2. Which of the following factors are not responsible for unbalancing in rotating systems? **[d]**

a. Errors b. Tolerances c. Shape of the rotor d. None of the above

3. Determine magnitude of balancing mass required if 250 mm is the radius of rotation. Masses of A, B and C are 300 kg, 250 kg and 100 kg which have radii of rotation as 50 mm, 80 mm and 100 mm respectively . The angles between the consecutive masses are 110^o and 270^o respectively. **[b]**
   a. 45.36 kg b. 47.98 kg c. 40.50 kg d. None of the above
4. The unbalanced force caused due to reciprocating mass is given by the equation **[c]**

   a. $mr\omega^2 \sin\theta + mr\omega^2 (\sin 2\theta/n)$ b. $mr\omega^2 \sin\theta + mr\omega^2 (\cos 2\theta/n)$
   c. $mr\omega^2 \cos\theta + mr\omega^2 (\cos 2\theta/n)$ d. $mr\omega^2 (\sin\theta + \sin 2\theta/n)$
5. The ratio of height of porter governor (when length of arms and links are equal) to the height of

watt governor is (Where m is the mass of the ball and M is the mass of sleeve) **[a]**

a. (m+M)/m b. M/(m+M)

c. m/(m+M) d. None of the above

6. A governor is said to be isochronous when equilibrium speed of all radii of rotation of the balls with in the working range **[a]**

a. Is constant b. Varies uniformly

c. Is not constant c. None of the above

7. A Hartnell governor is a governor of the **[c]**

a. inertia type b. pendulum type

c. spring controlled type d. dead weight type

8. Which one of the following is a Dead weight type governor? **[a]**

a. Porter Governor b. Hartnell Governor c. Wilson-Hartnell Governor

d. Hartung Governor

9. Height of a Governor is distance measured from **[b]**

a. the centre of two balls mass

b. the centre of balls mass to the point of intersection of upper arms

c. the centre of balls mass to the point of intersection of lower links

d. the point of intersection of upper arms to the point of intersection of lower links

10. Which of the following is pendulum type of Governor? **[a]**

a. Watt Governor b. Proell Governor c. Porter Governor d. Hartnell Governor

Fill in the blanks

1. Hartnell Governor is not suitable for High speeds ----------(No)
2. The sensitiveness of a Governor is----------((N2-N1)/N
3. Watt Governor can never be isochronous?-------(No --Porter Governor)
4. The primary unbalanced force is maximum when the angle of inclination of the crank with the line of stroke is--------(180°)
5. The partial balancing means --------(balancing partially the reciprocating masses)
6. In order to facilitate the starting of locomotive in any position, the cranks of a locomotive, with two cylinders, are placed at _____ to each other.(90°)
7. In a locomotive, the ratio of the connecting rod length to the crank radius is kept very large in order to--------(minimize the effect of secondary forces)
8. If c be the fraction of the reciprocating parts of mass m to be balanced per cyclinder of a steam locomotive with crank radius r, angular speed ω, distance between centre lines of two cylinders a, then the magnitude of the maximum swaying couple is given by----------(1 – c / √2mrω2a)
9. The swaying couple is maximum or minimum when the angle of inclination of the crank to the line of stroke (θ) is equal to----------(45° and 225°)
10. The tractive force is maximum or minimum when the angle of inclination of the crank to the line of stroke (θ) is equal to----------(135° and 315°)
11. The swaying couple is due to the----------(primary unbalanced force)
12. In a locomotive, the maximum magnitude of the unbalanced force along the perpendicular to the line of stroke, is known as--------(hammer blow)
13. The effect of hammer blow in a locomotive can be reduced by----------(decreasing the speed)

Unit 5

Choose the best answer

1. What are discrete parameter systems? **(b)**

a. Systems which have infinite number of degree of freedom

b. Systems which have finite number of degree of freedom

c. Systems which have no degree of freedom

d. None of the above

2. In which type of vibrations, amplitude of vibration goes on decreasing every cycle? **(a)**
   a. Damped vibrations b. Undamped vibrations c. Both a. and b. d. None of the above
3. Which of the following vibrations are classified according to magnitude of actuating force? **(b)**
a. Torsional vibrations b. Deterministic vibrations c. Transverse vibrations
   d. All of the above
4. According to which method, maximum kinetic energy at mean position is equal to maximum potential energy at extreme position?**(b)**
   a.Energy method
   b. Rayleigh's method
   c. Equilibrium method
   d. All of the above
5. What are deterministic vibrations? **(a)**
   a.Vibrations caused due to known exciting force
   b. Vibrations caused due to unknown exciting force
   c. Vibrations which are aperiodic in nature
   d. None of the above
6. Which among the following is the value of static deflection (δ) for a fixed beam with central point load? **(a)**
   a.(Wl^3) /(192 EI)
   b. (Wl^2) /(192 EI)
   c. (Wl^3) /(384 EI)
   d. None of the above
7. $\delta = (W a^2b^2) / (3 EIl)$ is the value of deflection for _____**(b)**
   a. simply supported beam which has central point load
   b. simply supported beam which has eccentric point load
   c. simply supported beam which has U.D.L. point load per unit length
   d. fixed beam which has central point load
8. In vibration isolation system, if ω/ωn, then the phase difference between the transmitted force and the disturbing force is **[c]**
   a) 0°
   b) 90°
   c) 180°
   d) 270°
9. When a body is subjected to transverse vibrations, the stress induced in a body will be **[b]**
   a) shear stress
   b) bending stress
   c) tensile stress
   d) compressive stress
10. The critical speed of a shaft with a disc supported in between is equal to the natural frequency of the system in **[a]**
    a) transverse vibrations
    b) torsional vibrations
    c) longitudinal vibrations
    d) none of the mentioned
11. In steady state forced vibrations, the amplitude of vibrations at resonance is _____ damping coefficient. **[c]**
    a) equal to
    b) directly proportional to
    c) inversely proportional to
    d) independent

Fill in the blanks

1. When there is a reduction in amplitude over every cycle of vibration, then the body is said to have-------(damped vibration)
2. In vibration isolation system, if $\omega/\omega n < 2$, then for all values of damping factor, the transmissibility will be-------(greater than unity)
3. The accelerometer is used as a transducer to measure earthquake in Richter scale. Its design is based on the principle that----------
   (its natural frequency is equal to the frequency of vibration)
4. While calculating the natural frequency of a spring-mass system, the effect of the mass of the spring is accounted for by adding X times its value to the mass, where X is -------(1/3)
5. Critical speed is expressed as--------(natural frequency of the shaft)
6. The first critical speed of an automobile running on a sinusoidal road is calculated by------ (Resonance)
7. When there is a reduction in amplitude over every cycle of vibration, then the body is said to have---------(damped vibration)
8. Longitudinal vibrations are said to occur when the particles of a body moves--------
   (parallel to its axis)
9. When a body is subjected to transverse vibrations, the stress induced in a body will be ---------(tensile stress)
10. The factor which affects the critical speed of a shaft is-------(diameter of the disc)
11. The ratio of the maximum displacement of the forced vibration to the deflection due to the static force, is known as--------(magnification factor)

QUESTION BANK

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	UNIT-I		
1	a. What is the gyroscopic effect on a ship when it turns towards left and the propeller rotates counterclockwise when viewed from stern. b. The mass of turbine rotor of a ship is 8 tonnes and has a radius of gyration of 0.6 meters. It rotates at 1800 rpm clockwise when looking from the front. Determine the gyroscopic effect if i) The ship is travelling at 100 km/h and steers to the right in a curve of 70 meters radius. ii) The ship is pitching and the bow descends with maximum velocity. The pitching is simple harmonic and the total angular movement between the extreme positions is 10 degrees. iii) The ship is rolling and at a certain instant has an angular velocity of 0.03 radians/ second clockwise when looking from bow.	Apply understand	1,2

2	a. What is the effect of gyroscopic couple on the stability of a two wheeler taking a turn? b. The mass of the motor cycle along with the rider is 180 kg. The height of the centre of gravity of total mass is 600mm above the ground when it moves straight. Each wheel has a diameter of 700mm and mass moment of inertia of 2 kgm^2. The engine rotates at a speed of 5 times the road wheel and engine rotating parts have mass moment of inertia of 0.2	Understand Apply	1,2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	kgm^2. Determine the angle of heel required if the motor cycle negotiates a curve of radius 100 meters at a speed of 108 km/hr.		
3	a. Explain the gyroscopic effect on an aero plane. b. A racing car weighs 20kN.It has a wheel base of 2m, track width of 1m and height of C.G 300mm above ground level and lies midway between the front and rear axles. The engine flywheel rotates at 3000 rpm clockwise when viewed from the front. The moment of inertia of the flywheel is $4kgm^2$ and the moment of inertia of each wheel is $3kgm^2$ Find the reactions between the wheels and the ground when the car takes a curve of 15m towards right at 30 km/hr, taking into consideration the gyroscopic and centrifugal effects. Each wheel radius is 400mm.	Understand Apply	1,2
4	a. An aero-plane makes a complete half circle of 50 m radius towards left in a time of 20 seconds when flying at 200kmph. The rotary engine and the propeller of the plane has a mass of 400kg and a radius of gyration of 0.3 m. The engine rotor rotates at 2400 rpm clockwise when seen from the rear. Find the gyroscopic couple on the air craft and state its effect on the aero-plane. b. Define precession axis and spin axis by neat sketches.	Understand Apply Analyse	1,2
5	a. Derive the equation for Gyroscopic couple for a rotating disc. b. A uniform disc having a mass of 8 kg and radius of gyration 150 mm is mounted on one end of a horizontal arm of length 200 mm. The other end rotates freely in a bearing. The disc is given a clockwise spin of 240 rpm. Determine the motion of the disc if its arm remains horizontal.	Understand ,application	1,2
6	a. What do you mean by applied and constraint forces? Explain. b. Determine the required input torque on the crank of a slider crank mechanism for static equilibrium when the applied piston load is 1500N. The length of the crank and connecting rod are 40 mm and 100 mm respectively and the crank has turned through 45^0 from the inner dead center.	Understand Apply	1,2
7	a. State and explain D'Alembert's principle. b. In a four link mechanism ABCD, the link AB revolves with an angular velocity of 10 radians/second and angular acceleration of 20 radians/sec^2 at the instant when it makes an angle of 45^0 with AD the fixed link. The lengths of the links are AB=CD=800mm, BC=1000mm and AD=1500mm. The mass of the links is 4kg/m length. Determine the torque required to overcome the inertia forces, neglecting the gravitational effects. Assume the links to be of uniform cross-section.	Understand application, analysis	1,2
8	a. State the principle of super position of forces for a planar four bar mechanism. b. In a four bar mechanism, the link 3 and 4 are subjected to forces of 100N at an angle of 60^0 and 50N at an	Understand application, analysis	1,2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	angle of 45^0. The dimensions of the links are O_2O_4= 800 mm, O_2B=500 mm, BC=450 mm, O_4C= 300mm, BD=200 mm and O_4E=150mm. Calculate the shaft torque on link2 for static equilibrium of the mechanism along with the constraint forces.		
9	a. A vertical petrol engine 150 mm diameter and 200 mm stroke has a connecting rod 350 mm long. The mass of the piston is 1.6 kg and the engine speed is 1800 rpm. On the expansion stroke with crank angle 30^0 from top dead center, the gas pressure is 750 kN/m^2. Determine the net thrust on the piston. b. Explain the analytical method of calculating the torque on a reciprocating engine.	Understand application,	2,3
10	a. Explain the static and dynamic force analysis. b. For the static equilibrium of a quick return mechanism of crank and slotted lever, determine the required input torque for a force of 5000N acting from left to right on the slider. The dimensions of various links are crank AB=120mm, fixed link AC =175 mm, connecting link DE=250mm and slotted link CD= 300 mm. The crank makes 60^0 with the vertical.	Understand application, analysis	2,3
	UNIT – II		
1	a. Explain the terms friction axis, friction couple and friction circle. b. The mean diameter of Whitworth bolt having V-Threads is 25 mm. The pitch of the thread is 5 mm and the angle of V is 55^0. The bolt is tightened by a nut whose mean radius of bearing surface is 25 mm. If the coefficient of friction between nut and bolt is 0.1 and nut with bearing surface is 0.16, find the force required at the end of the spanner 0.5 m long when the load on the bolt is10kN.	Understand , application, analysis	1,2
2	a. Distinguish between static and dynamic friction with suitable examples. b. An effort of 3000N is required to just move a certain body up an inclined plane of angle 12^0, force acting parallel to the plane. If the angle of inclination is increased to 15^0, then the effort required is 3500N. Find the weight of the body and the coefficient of friction.	Understand application,	1,2
3	a. Derive expression for the mean torque transmitted for a body moving down an inclined plane. b. The mean diameter of a screw jack having pitch of 10mm is 50mm. A load of 20kN is lifted through a distance of 170 mm. Find the work done in lifting the load and η of the screw jack when i) the load rotates with the screw and ii) load rests on loose end which does not rotate with the screw.	Understand application,	1,2
4	a. Distinguish between brakes and dynamometers. b. Derive an expression for total braking torque about fulcrum in a differential band brake when the brake drum rotates in counter clockwise direction.	Understand ,application, analysis	1,2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
5	a. What is a clutch? Describe a single plate clutch with a neat diagram. b. Determine the axial force required to engage a cone clutch transmitting 20kW of power at 750 rpm. Average friction diameter of the cone is 400mm and average pressure intensity60 kN/m^2. Semi cone angle is 10^0 and coefficient of friction is 0.25.Also find the width of the friction cone.	Knowledge, Understand Apply	
6	a. What is meant by self locking and a self energized brake? b. A band brake acts on 3/4 th of a circumference of a brake drum of 450 mm diameter which is keyed to a shaft. The band brake provides a braking torque of 225 Nm. One end of the lever is attached to a fulcrum pin of the lever and the other end is attached to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and coefficient of friction is 0.25, find the operating force when the drum rotates in i) Clock-wise direction, ii) anti- clockwise direction.	Understand application,	1,2
7	a. Name different types of dynamometers and explain any one of them. b. In a vertical belt transmission dynamometer, the diameter of the driving pulley rotating at 1500 rpm is 80 mm. The centre distance of the intermediate pulley from the fulcrum is also 80 mm each. The weighing pan on the lever is at a distance of 250 mm. find the power transmitted when a mass of 20kg is required on the pan including its own mass.	Understand ,application,	1,2
8	a. Explain a torsion dynamometer with a neat sketch. b. The following data refer to a rope brake dynamometer in a laboratory experiment. Diameter of the flywheel=1m Diameter of the rope=10 mm. Dead weight on the brake=50 kg Speed of the engine =180 rpm Spring balance reading=120 N. Find the power of the engine?	Understand application, analysis	2,3
9	a. Explain the function of absorption type dynamometer. b. Describe with a neat sketch the torsion dynamometer.	Understand application,	2,3
10	a. Explain in detail the calculations involved in finding the power transmitted in a transmission type dynamometer. b. Explain the function of transmission type dynamometer.	Understand ,application,	
	UNIT – III		
1	a. Define the terms coefficient of fluctuation of energy and coefficient of fluctuation of speed. b. A machine shaft running at 200 rpm requires a torque increasing uniformly from 1200 Nm to 3600 Nm during180^0 of rotation. It is steady at 3600 Nm for subsequent one revolution and decreases uniformly to its original value of 1200 Nm in subsequent one revolution and is again steady at 1200 Nm for the next two revolutions. This completes the cycle. The motor has a constant torque which has a rotor of mass 450 kg and 250mm radius of gyration. In addition, if it	Understand application,	1,2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	has a flywheel of mass 2000kg and 600mm radius of gyration fitted to the shaft, determine i) Power required driving the motor. Percentage fluctuation of speed.		
2	a. What is a fly wheel? What is its function? b. The effective turning moment exerted by a two stroke engine at crank shaft is T= 8000+ 1000sin2θ- 2000cos2θ where θ is the inclination of the crank to inner dead center. The mass of the flywheel is 500kg and radius of gyration is 750 mm. The engine speed is 300 rpm. Determine the power developed, the total percentage fluctuation of speed and maximum angular retardation.	Understand application, analysis	1,2
3	a. Derive the equation for determining the mass of the flywheel rim involving the linear velocity, density and stress. b. The turning moment diagram for a multi cylinder engine has been drawn to a scale of 1mm to 500 Nm of torque and 1mm to 6^0 of crank displacement. The intercepted areas between the output torque curve and the mean resistance line taken in order from one end of the engine are -30, +410, -280, +320, -330, +250, -360, +280, -260 mm^2 when the engine runs at 800 rpm. The engine has a stroke of 300mm and the fluctuation of speed is not to exceed 2% of mean speed. Determine suitable diameter and cross section of the flywheel rim for a limiting value of safe centrifugal stress of 7 Mega Pascal. The material density is 720kg / m^3. Width of the rim is 5 times the thickness.	Understand application, analysis	1,2
4	a. Describe the graphical method of determining the torque considering the inertia of the connecting rod of a reciprocating engine. b. The turning moment diagram for a multi cylinder engine has been drawn to a scale of 1cm= 5000Nm torque and 1cm= 60^0 respectively. The intercepted areas between output torque curve and mean resistance taken in order from one end are -0.3, +4.1, -2.8, +3.2, -3.3, +2.5, -3.6, +2.8, -2.6 square cm when the engine is running at 800rpm. The engine has a stroke of 300 mm and the fluctuation of speed is not to exceed 2% of mean speed. Determine a suitable diameter of cross section of the flywheel rim for limiting value of the shaft centrifugal stress of 280 X 10^3 N/ m^2. The material density may be assumed as 7.2 g/cm^3. Assume the thickness of the rim to be ¼ th of the width.	Understand ,application, analysis	1,2
5	a. Describe the turning moment diagram for a single cylinder double acting steam engine. b. A single cylinder single acting four stroke gas engine develops 20kW at 300 rpm. The work done by the gases during the expansion stroke is three times the work done on the gases during the compression stroke, the work done during the suction and exhaust strokes is negligible. If the total fluctuation of speed is not to exceed ± 2 percent of the mean speed and the turning moment diagram during compression and expansion is assumed to be triangular in	Understand application, analysis	2,3

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	shape, find the moment of inertia of the flywheel.		
6	a. What is the function of a governor? How does it differ from that of a flywheel? b. Each arm of a porter governor is 300 mm long and is pivoted on the axis of rotation. Each ball has a mass of 6 kg and the sleeve weighs 18kg. The radius of rotation of the ball is 200 mm when the governor begins to lift and 250 mm when the speed is maximum. Determine the maximum and minimum speeds and the range of speed of the governor.	Understand ,application,	1,2
7	a. Derive an expression for the determination of equilibrium speed of a Proell governor. b. The weight of each ball of a Proell governor is 90N. The central load is 1500N and the arms are 250mm long. The arms are open and pivoted at a distance of 50 mm from the axis of rotation. The extension of the lower arms to which each ball is attached is 125 mm long and the radius of rotation of the balls is 250mm. When the arms are inclined at 40^0 to the axis of rotation, find i) the equilibrium speed for the above configuration and the coefficient of insensitiveness if friction is equivalent to a force of 20N at the sleeve.	Understand application, analysis	2,3
8	a. Explain the terms sensitiveness, hunting and stability relating to governors. b. A Hartnell governor having a central sleeve spring and two right angle bell crank levers moves between 290 rpm and 310 rpm for a sleeve lift of 15 mm. The sleeve arms and the ball arms are 80 mm and 120 mm respectively. The levers are pivoted at 120 mm from the governor axis and the mass of each ball is 2.5 kg. Determine the loads on the spring at the lowest and highest equilibrium speeds and the stiffness of the spring.	Understand application, analysis	2,3
9	a. Derive an expression for the determination of equilibrium speed of a Porter governor. b. Calculate the minimum speed of a Porter governor , which has equal arms each 200mm long and are pivoted on the axis of rotation. The mass of each ball is 5 kg and the minimum radius of rotation for the ball is 100mm.	Understand application,	1,2
10	a. Derive an expression for determination of equilibrium speed of Hartung governor. b. In a spring controlled governor of the Hartung type, the length of the ball and sleeve arms are 80mm and 120mm respectively. The total travel of the sleeve is 25 mm. In the mid position, each spring is compressed by 50mm and the radius of rotation of the mass center is 140mm. Each ball has a mass of 4 kg and the spring has a stiffness of 10kN/m. The equivalent mass at the sleeve is 16kg. Neglecting the moment due to the revolving masses, when the arms are inclined, determine the ratio of range of speed to the mean speed of the governor. Also find the speed in mid position.	Understand application,	1,2
	UNIT – IV		
1	a) What is the necessity of balancing for rotors of high speed engines?	Understand application,	1,2

<table>
<tr><th>S. No.</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcomes</th></tr>
<tr><td></td><td>b) A rigid rotor has all its unbalance in one plane and can be considered to consist of three masses m_1 = 5 kg, m_2 = 3 kg at an angle of 165^0 counter clockwise from m_1 and m_3 = 8 kg at angle 85^0 clockwise from m_1. The radii r_1 = 200mm, r_2 = 80mm and r_3 = 140 mm. Determine the balancing mass required at a radius of 100 mm. Specify the location of this mass with respect to m_1.</td><td>knowledge</td><td></td></tr>
<tr><td>2</td><td>a. What is meant by static and dynamic unbalance in machinery?
b. A rotor has the following properties:
<table><tr><th>Mass</th><th>Magnitude</th><th>Radius</th><th>Angle</th><th>Axial distance from first mass</th></tr><tr><td>1</td><td>9 kg</td><td>100 mm</td><td>0^0</td><td>-</td></tr><tr><td>2</td><td>7 kg</td><td>120 mm</td><td>60^0</td><td>160 mm</td></tr><tr><td>3</td><td>8 kg</td><td>140 mm</td><td>135^0</td><td>325 mm</td></tr><tr><td>4</td><td>6 kg</td><td>120 mm</td><td>270^0</td><td>560 mm</td></tr></table>If the shaft is balanced by two counter masses located at 100 mm radius and revolving in planes midway of planes I and 2, and midway of planes3 and 4, determine the magnitude of the masses and their corresponding angular positions.</td><td>Understand application,</td><td>1,2</td></tr>
<tr><td>3</td><td>a. What is primary and secondary balancing in reciprocating engines?
b. The cranks of a three cylinder locomotive are set at 120^0. The stroke is 120 mm, the length of the connecting rod is 240 mm, the mass of the reciprocating parts per cylinder is 1 kg and the speed of the crank shaft is2400 rpm. Determine the magnitude of primary and secondary balancing.</td><td>Understand ,application,</td><td>1,2</td></tr>
<tr><td>4</td><td>a) Explain the balancing of multi cylinder in line engines?
b) An air compressor has four vertical cylinders 1,2,3 and 4 inline and the driving cranks at 90^0 intervals reach their uppermost positions in this order. The cranks are of 150 mm radius, the connecting rods 500 mm long and the cylinder centre lines 400 mm apart. The mass of the reciprocating parts of each cylinder is 22.5 kg and the speed of rotation is400 rpm. Show that there are no out of balance primary and secondary forces. Determine the corresponding couples indicating their positions for maximum values. The central plane of the machine may be taken as reference plane.</td><td>Understand ,application, analysis</td><td>2,3</td></tr>
<tr><td>5</td><td>a) Obtain the expressions for primary and secondary forces for a V-Engine having two identical cylinders lying in a plane. The included angle between the two cylinders may be taken as 45^0.
b) The pistons of 60^0 twin V-Engine have strokes of 120 mm. The connecting rods driving a common crank are of length 200 mm. The mass of the reciprocating parts per cylinder is</td><td>Understand application, analysis</td><td>2,3</td></tr>
</table>

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	1.5 kg and the speed of the crank shaft is 2500 rpm. Determine the magnitude of primary and secondary unbalanced forces.		
6	a) Explain the method of balancing of different masses revolving in the same plane. b) A single cylinder horizontal engine runs at 120 rpm. The length of stroke is 400mm. The mass of the revolving parts assumed concentrated at the crank pin, is 100kg and mass of reciprocating parts is 150kg. Determine the magnitude of the balancing mass required to be placed opposite to the crank at a radius of 150mm which is equivalent to all the revolving and 2/3 of the reciprocating masses. If the crank turns 30^0 from the inner dead center, find the magnitude of the unbalanced force due to the balancing mass.	Understand application, analysis	2,3
7	a) How is the effect of hammer blow reduced in coupled locomotives? b) An inside cylinder locomotive has its cylinder center lines 0.7 m apart and has a stroke of 0.6 m. The rotating masses per cylinder are equivalent to 150kg at the crank pin and the reciprocating masses per cylinder are 180kg. The wheel center lines are 1.5m apart. The cranks are at right angles. The whole of rotating parts and 2/3 of reciprocating masses are to be balanced by masses placed at a radius of 0.6m. Find the magnitude and direction of the balancing masses.	Understand application, analysis	1,2
8	a) How are different masses rotating in different planes balanced? b) Four masses P, Q, R and S are completely balanced. Masses R and S make angles of 90^0 and 210^0 respectively with Q in the same sense. The planes containing Q and R are 300 mm apart. Masses P, Q, R and S are supposed to be concentrated at radii of 360mm, 480mm, 240mm and 300mm respectively. The masses Q,R and S are 15kg, 25kg and 20kg respectively. Determine i) The mass P and its angular position. ii) The planes in which the masses P and S are placed.	Understand application, analysis	1,2
9	a) Explain the direct and reverse crank method for determining the unbalanced forces in radial engines. b) The three cylinders of an air compressor have their axes 120^0 to one another and their connecting rods are coupled to a single crank. The stroke is 100mm and the length of each connecting rod is 150mm. The mass of the reciprocating parts per cylinder is 1.5 kg. Find the maximum primary and secondary forces acting on the frame of the compressor when running at 3000 rpm.	Understand application, analysis	2,3
10	a) Explain the method of balancing V- Engines. b) A V- twin engine has the cylinder axes at right angles and the connecting rods operate a common crank. The reciprocating masses per cylinder are 11.5kg and the crank radius is 75mm. The length of connecting rod is 0.3m. Show that the engine may be balanced for primary forces. If the engine	Understand ,application, analysis	2,3

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	speed is 500rpm, what is the value of maximum resultant secondary force?		
	UNIT – V		
1	a. Describe Dunkerley's method to find the natural frequency of a shaft carrying several loads. b. A shaft 50 mm diameter and 3 m long is simply supported at its ends and carries three loads of 1000 N, 1500N and 750N at 1m, 2m and 2.5m from the left support. Modulus of elasticity is 200 GN/m^2. Find the frequency of transverse vibrations.	Understand application,	1,2
2	a. Distinguish between longitudinal, transverse and torsional vibrations. b. A cantilever shaft of 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus of the shaft material is 200 GN / m^2. Determine the frequency of longitudinal and transverse vibrations of the shaft.	Understand application,	1,2
3	a. What is meant by Magnification factor in case of forced vibrations? On what factors does it depend? b. A vibrating system consists of a mass of 50 kg, a spring of stiffness 30kN/m and a damper. The damping provided is only 20% of the critical value. Determine the damping factor, critical damping coefficient and logarithmic decrement.	Understand ,application, knowledge	1,2
4	a. What is critical or whirling speed of shaft? b. Calculate the whirling speed of a shaft 20 mm diameter and 0.6 m long, carrying a mass of 1 kg at its mid point. Density of the shaft material is 40 Mg/m^3 and E = 200 GN/m^2. Assume freely supported shaft.	Understand ,application,	1,2
5	a. Discuss a three rotor vibratory system and find the ratio of their amplitudes. b. A 1.5 m long shaft AB has flywheels at its ends A and B. The mass of the flywheel at the end A is 600kg and its radius of gyration is 400mm. The corresponding values for the flywheel at the end B are 300kg and 300 mm. The diameter of the shaft for the first 400mm starting from the end A is 50mm, 60 mm diameter for the next portion of 500 mm length and the remaining portion of 600mm length is unknown. Determine the diameter of the shaft for the portion B so that the node of the torsional vibration of the system will be at the center of 500 mm long segment. Also determine the frequency of vibration.	Understand application, analysis	1,2
6	a. Derive the equation for determining the frequency of torsional vibration in a two rotor system. b. A stepped shaft of 0.05 m in diameter for the first 0.6 m length, 0.08 m diameter for the next 1.8 m and 0.03 m diameter for the remaining 0.25 m length. While the 0.05 m diameter end is fixed, the 0.03 m diameter end of the shaft carries a rotor of mass moment of inertia 14.7 kg-m2. If the modulus of elasticity of the shaft material is 0.83 x 1011 N/m2, find the natural frequency of torsional oscillations,	Understand application,	1,2

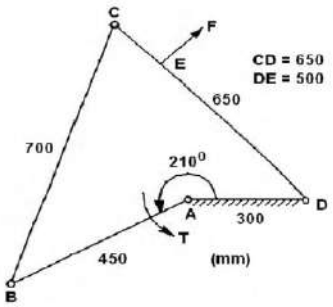
S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	neglecting the inertia effect of the shaft.		
7	a. Discuss the effect of inertia of the shaft in free torsional vibration. b. A shaft 100 mm diameter and 1000 mm long is fixed at one end and the other end carries a flywheel of mass 90 kg. The radius of gyration of the flywheel is 500mm. Find the frequency of torsional vibration, if the modulus of rigidity for the shaft material is $80GN/m^2$.	Understand application,	1,2
8	a. Define vibration isolation and transmissibility. b. A single cylinder engine of total mass 200kg is to be mounted on an elastic support which permits vibratory movement in vertical direction only. The mass of the piston is 3.5 kg and has a vertical simple harmonic motion with a stroke of 150mm. It is desired that the maximum vibratory force transmitted through the elastic support to the foundation shall be 600N when the engine speed is 800 rpm. Find the necessary stiffness of the elastic support and the amplitude of vibration at 800 rpm.	Understand application, analysis	1,2
9	a. Explain the terms under damping, critical damping and over damping. b. An instrument vibrates with na frequency of 1 Hz. When there is no damping. When the damping is provided, the frequency of damped vibration was observed to be 0.9 Hz. Find the damping factor and logarithmic decrement.	Understand ,application,	2,3
10	a. Establish an expression for the amplitude of forced vibration. b. A body of mass 20kg is suspended from a spring which deflects 15mm under this load. Calculate the frequency of free vibrations and verify that a viscous damping force of 1000N at a speed of 1 m/s is just sufficient to make the motion aperiodic.	Understand application, analysis	2,3

TUTORIAL QUESTIONS

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 1 Tutorials Short Answer Questions		
1.	Write a short note on gyroscope.	Knowledge	a
2.	What do you understand by gyroscopic couple ? Derive a formula for its magnitude.	Knowledge	a
3.	Explain the application of gyroscopic principles to aircrafts.	Comprehension	a
4.	Describe the gyroscopic effect on sea going vessels.	Application	a
5.	Discuss the effect of the gyroscopic couple on a two wheeled vehicle when taking a turn.	Comprehension	a
6.	Define ‘inertia force’ and ‘inertia torque’.	Knowledge	a
7.	What is the difference between piston effort, crank effort and crank-pin effort?	Knowledge	a
8.	Discuss the method of finding the crank effort in a reciprocating single acting, single cylinder petrol engine.	Analysis	a
9.	Describe the graphical and analytical method of finding the inertia torque on the crankshaft of a horizontal reciprocating engine.	Comprehension	a
10.	How are velocity and acceleration of the slider of a single slider crank chain determined analytically?	Knowledge	a

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 1 Tutorials Long Answer Questions		
1.	The turbine rotor of a ship has a mass of 20 tones & a radius of gyration of 0.75m.Its speed is 2000 rpm.the ship pitches 6degrees above & below the horizontal position. One complete oscillation takes 18 sec & the	Analytical Problem	**A**

	motion is simple harmonic. Determine (i)The maximum couple tending to shear the holding down bolts of the turbine. (ii)The maximum angular acceleration of the ship during pitching & (iii)The direction in which the bow will tend to turn while rising, if the rotation the rotor is clock wise when looking from rear.		
2.	The rotor of the turbine of a yacht makes 1200 rpm clockwise when viewed from the stern. The rotor has a mass of 750 kg, and its radius of gyration is 250 mm. Find the maximum gyroscopic couple transmitted to the hull (body of the yacht), when the yacht pitches with maximum angular velocity of 1 rad/s.	Analytical Problem	**A**
3.	An aeroplane makes a complete half circle of 50 meters radius, towards left, when flying at 200 kmph. The rotary engine and the propeller of the plane has a mass of 400 kg. and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it.	Analytical Problem	**A**
4.	A car weighs 20KN. It has a wheel base of 2m, Track width 1m & Height of C.G. 300 mm above the ground level & lies midway between the front & rear axle. The engine flywheel rotates at 3000 rpm clockwise when viewed from the front. The moment of inertia of the fly wheel is 4kg-m² & MOI of each wheel is 3 kg-m², find the reactions between the wheels & the ground when car takes the curve of 15m radius towards right at 30 km/hr, taking into consideration the gyroscopic & the centrifugal effects. Each wheel radius is 400mm.	Analytical Problem	**A**
5.	A four wheeled motor car of mass 2000 kg has a wheel base 2.5 m, track width 1.5 m and height of center of gravity 500 mm above the ground level and lies at 1 meter from the front axle. Each wheel has an an effective diameter of 0.8 m and a moment of inertia of 0.8 kg-m2. The drive shaft, Engine flywheel and transmission are rotating at 4 times the speed of road wheel, in a clockwise direction when viewed from the front, and is equivalent to a mass of 75 kg having a radius of gyration of 100 mm. If the car is taking a right turn of 60 m radius at 60 km/h, find the load on each wheel.	Analytical Problem	**A**
6.	The moment of inertia of an aeroplane air screw is 20 kg-m2 and the speed of rotation is 1000 rpm clockwise when viewed from the front. The speed of the flight is 200 kmph. Find the gyroscopic reaction of the air screw on the aeroplane when it makes a	Analytical Problem	**A**

	lefthanded turn on a path of 150 m radius.		
7.	In a slider crank mechanism, the lengths of the crank and the connecting rod are 480 mm and 1.6 m respectively. It has an eccentricity of 100 mm. Assuming a velocity of 20 rad/sec of the crank OA. Calculate the following at an interval of 30 degrees. i). Velocity and the acceleration of the slider ii). Angular velocity and angular acceleration of the connecting rod.	Analytical Problem	**A**
8.	In a Four-link mechanism, the dimensions of the links are: AB=20 mm, BC= 66mm, CD= 56 mm, and AD = 80 mm. AD is the fixed link. The crank rotates at uniform angular velocity of 10.5 rad/sec in the counter-clockwise direction. Determine the angular displacements, angular velocities angular accelarations of the output link DC and the coupler BC for a complete revolution of the crank at an interval of 40 degrees.	Analytical Problem	**A**
9.	Determine the required input torque on the crank of a slider-crank mechanism for the static equilibrium when the applied piston load is 1500N. the lengths of the crank and the connecting rod are 40mm and 100 mm respectively, and the crank has turned through 45^0 from the inner dead centre.	Analytical Problem	**A**
10.	Find the torque required to be applied to the link AB of the mechanism shown in figure to maintain the static equilibrium. 	Analytical Problem	**A**

TUTORIAL QUESTIONS:

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
Unit 2 Tutorials Short Answer Questions			

1.	Draw the turning moment diagram of a single cylinder double acting steam engine.	Knowledge	a
2.	Explain precisely the uses of turning moment diagram of reciprocating engines.	Knowledge	a
3.	Explain the turning moment diagram of a four stroke cycle internal combustion engine.	Comprehension	a
4.	Discuss the turning moment diagram of a multi cylinder engine.	Application	a
5.	Explain the terms 'fluctuation of energy' and 'fluctuation of speed' as applied to flywheels.	Comprehension	a
6.	Define coefficient of fluctuation of energy.	Comprehension	a
7.	What is the function of a flywheel? How does it differ from that of a governor?	Knowledge	a
8.	Prove that the maximum fluctuation of energy, $\triangle E = E$ X $2C$S	Analysis	a
9.	Define coefficient of fluctuation of speed	Comprehension	a
10.	An engine flywheel has a mass of 6.5 tonnes and the radius of gyration is 2 m. If the maximum and minimum speeds are 120 r. p. m. and 118 r. p. m. respectively, find maximum fluctuation of energy.	Knowledge	a

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
	Unit 2 **Tutorials** **Long Answer Questions**		
1.	The turning moment diagram of a petrol engine is drawn to the following scales: Turning moment, 1mm = 5 N-m; crank angle, 1 mm = 1_0. The turning moment diagram repeats itself at every half revolution of the engine & the areas above & below the mean turning moment line taken in order are 295, 685,40, 340, 960,270 mm^2 . The rotating parts are equivalent to a mass of 36 kg at the radius of gyration of 150 mm. Determine the co efficient of fluctuation of speed when the engine runs at 1800 rpm.	Analytical Problem	**A**
2.	The turning moment diagram of a multi cylinder engine is drawn to the following scales: Turning moment, 1mm = 600 N-m vertically;& 1mm = 30 horizontally, The intercepted areas between the output torque curve & the mean resistance line, taken in	Analytical Problem	**A**

	order from one end, are as follows : +52 -124, +92, -140, + 85, -72 & +107 mm^2. When the engine is running at a speed of 600 rpm. If the total fluctuation of speed is not to exceed± 1.5 % of the mean, find the necessary mass of the flywheel of radius 0.5 m.		
3.	The turning moment diagram of a petrol engine is drawn to the following scales: Turning moment, 1mm = 6 N-m; crank angle, 1 mm = 2^0. The turning moment diagram repeats itself at every half revolution of the engine & the areas above & below the mean turning moment line taken in order are 290, 680,45, 345, 965,275 mm^2 . The rotating parts are equivalent to a mass of 36 kg at the radius of gyration of 155 mm. Determine the co efficient of fluctuation of speed when the engine runs at 1850 rpm.	Analytical Problem	**A**
4.	The turning moment diagram of a multi cylinder engine is drawn to the following scales: Turning moment, 1mm = 500 N-m vertically;& 1mm = 35 horizontally, The intercepted areas between the output torque curve & the mean resistance line, taken in order from one end, are as follows : +53,-125,+93, -142, + 86, -73 & +108 mm^2. When the engine is running at a speed of 600 rpm. If the total fluctuation of speed is not to exceed± 1.6 % of the mean, find the necessary mass of the flywheel of radius 0.6 m.	Analytical Problem	**A**

TUTORIAL QUESTIONS:

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
Unit 3 Tutorials Short Answer Questions			
1.	Discuss briefly the various types of friction experienced by a body.	Knowledge	a
2.	Neglecting collar friction, derive an expression for mechanical advantage of a square threaded screw moving in a nut, in terms of helix angle of the screw and friction angle.	Knowledge	a
3.	Derive from first principles an expression for the friction moment of a conical pivot assuming Uniform pressure.	Comprehension	a
4.	Derive from first principles an expression for the friction moment of a conical pivot assuming Uniform wear.	Application	a

5.	Describe with a neat sketch the working of a single plate friction clutch.	Comprehension	a
6.	Distinguish between brakes and dynamometers.	Comprehension	a
7.	Discuss the various types of the brakes.	Knowledge	a
8.	Describe with the help of a neat sketch the principles of operation of an internal expanding shoe.	Analysis	a
9.	Derive the expression for the braking torque.	Comprehension	a
10.	Describe the construction and operation of a prony brake or rope brake absorption dynamometer.	Knowledge	a

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
	Unit 3 **Tutorials** **Long Answer Questions**		
1.	A conical pivot bearing 150 mm in diameter has a cone angle of 120º. If the shaft supports an axial load of 20 kN and the coefficient of friction is 0.03, find the power lost in friction when the shaft rotates at 200 r.p.m., assuming 1. Uniform pressure, and 2. uniform wear.	Analytical Problem	**A**
2.	A plain collar type thrust bearing having inner and outer diameters of 200 mm and 450 mm is subjected to an axial thrust of 40 kN. Assuming coefficient of friction between the thrust surfaces as 0.025, find the power absorbed in overcoming friction at a speed of 120 r.p.m. The rate of wear is considered to be proportional to the pressure and rubbing speed.	Analytical Problem	**A**
3.	A single plate clutch (both sides effective) is required to transmit 26.5 kW at 1600 r.p.m. The outer diameter of the plate is limited to 300 mm and intensity of pressure between the plates is not to exceed 68.5 kN/m2. Assuming uniform wear and a coefficient of friction 0.3, show that the inner diameter of the plates is approximately 90 mm.	Analytical Problem	**A**
4.	A simple band brake is operated by a lever of length 500 mm. The brake drum has a diameter of 500 mm and the brake band embraces 5/8 of the circumference. One end of the band is attached to the fulcrum of the lever while the other end is attached to	Analytical Problem	**A**

	a pin on the lever 100 mm from the fulcrum. If the effort applied to the end of the lever is 2 kN and the coefficient of friction is 0.25, find the maximum braking torque on the drum.		
5.	A multiplate clutch has three pairs of contact surfaces. The outer and inner radii of the contact surfaces are 100 mm and 50 mm respectively. The maximum axial spring force is limited to 1 kN. If the coefficient of friction is 0.35 and assuming uniform wear, find the power transmitted by the clutch at 1500 r.p.m. A cone clutch is to transmit 7.5 kW at 900 r.p.m. The cone has a face angle of 12º. The width of the face is half of the mean radius and the normal pressure between the contact faces is not to exceed 0.09 N/mm2. Assuming uniform wear and the coefficient of friction between contact faces as 0.2, find the main dimensions of the clutch and the axial force required to engage the clutch.	Analytical Problem	**A**
6.	A differential band brake acting on the 3/4 th of the circumference of a drum of 450 mm diameter, is to provide a braking torque of 225 N-m. One end of the band is attached to a pin 100 mm from the fulcrum of the lever and the other end to another pin 25 mm from the fulcrum on the other side of it where the operating force is also acting. If the operating force is applied at 500 mm from the fulcrum and the coefficient of friction is 0.25, find the two values of the operating force corresponding to two directions of rotation of the drum.	Analytical Problem	**A**
7.	In a band and block brake, the band is lined with 14 blocks, each of which subtends an angle of 20° at the drum centre. One end of the band is attached to the fulcrum of the brake lever and the other to a pin 150 mm from the fulcrum. Find the force required at the end of the lever 1 metre long from the fulcrum to give a torque of 4 kN-m. The diameter of the brake drum is 1 metre and the coefficient of friction between the blocks and the drum is 0.25.	Analytical Problem	**A**
8.	A lorry is moving on a level road at a speed of 36 km/h. Its centre of gravity lies at a distance of 0.6 m from the ground level. The wheel base is 2.4 metres and the distance of C.G. from the rear wheels is 0.9 m. Find the distance travelled by the car before coming to rest when brakes are applied, (a) to the rear wheels, (b) to the front wheels, and (c) to all the four wheels. The coefficient of friction between the tyres and the road surface is 0.45.	Analytical Problem	**A**

TUTORIAL QUESTIONS:

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 4 Tutorials Short Answer Questions		
1.	What is the function of a governor?	Knowledge	a
2.	State the different types of governors.	Knowledge	a
3.	Prove that the sensitiveness of a Proell governor is greater than that of a Porter governor	Comprehension	a
4.	Define Hunting.	Application	a
5.	Discuss the controlling force and stability of a governor.	Comprehension	a
6.	How the different masses rotating in different planes are balanced?	Comprehension	a
7.	Explain the method of balancing of different masses revolving in the same plane.	Knowledge	a
8.	Discuss how a single revolving mass is balanced by two masses revolving in different planes.	Analysis	a
9.	Write a short note on primary and secondary balancing.	Comprehension	a
10.	Explain why only a part of the unbalanced force due to reciprocating masses is balanced by revolving mass.	Knowledge	a

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 4 Tutorials Long Answer Questions		
1.	A Porter governor has all four arms 250 mm long. The upper arms are attached on the axis of rotation and the lower arms are attached to the sleeve at a distance of 30 mm from the axis. The mass of each ball is 5 kg and the sleeve has a mass of 50 kg. The extreme radii of rotation are 150 mm and 200 mm. Determine the range of speed of the governor.	Analytical Problem	**A**
2.	A Proell governor has all four arms of length 305 mm. The upper arms are pivoted on the axis of rotation and the lower arms are attached to a sleeve at a distance of 38 mm from the axis. The mass of each ball is 4.8 kg	Analytical Problem	**A**

	and are attached to the extension of the lower arms which are 102 mm long. The mass on the sleeve is 45 kg. The minimum and maximum radii of governor are 165 mm and 216mm. Assuming that the extensions of the lower arms are parallel to the governor axis at the minimum radius, find the corresponding equilibrium speeds.		
3.	A hartnell governor having a central sleeve spring and two right-angled bell crank levers moves between 290 r.p.m. and 310 r.p.m. for sleeve lift of 15 mm. The sleeve arms and ball arms are 80 mm and 120 mm respectively. The leavers are pivoted at 120 mm from the governor axis and mass of each ball is 2.5 k. the ball arms are parallel to the governor axis at the lowest equilibrium speed. Determine : 1. loads on the spring at lowest and the highest equilibrium speeds, and 2. stiffness of the spring.	Analytical Problem	**A**
4.	The following particulars refer to a Wilson-Hart Nell governor : Mass of each ball = 125 mm; maximum radius =175 mm ; minimum speed = 240 r.p.m ; maximum speed = 250 r.p.m ; length of the ball arm of each bell crank lever=150 mm; length of the sleeve arm bell crank lever = 100 mm; combined stiffness of the two ball springs = 0.2 kN/m. Find the equivalent stiffness of the auxiliary spring referred to the sleeve.	Analytical Problem	**A**
5.	A rotating shaft carries four masses A, B, C and D which are radially attached to it. The mass centres are 30 mm, 38 mm, 40 mm and 35 mm respectively from the axis of rotation. The masses A, C and D are 7.5 kg, 5 kg and 4 kg respectively. The axial distances between the planes of rotation of A and B is 400 mm and between B and C is 500 mm. The masses A and C are at right angles to each other. Find for a complete balance, 1. the angles between the masses B and D from mass A, 2. the axial distance between the planes of rotation of C and D, 3. the magnitude of mass B.	Analytical Problem	**A**
6.	A rotating shaft carries four unbalanced masses 18 kg, 14 kg, 16 kg and 12 kg at radii 50 mm, 60 mm, 70 mm and 60 mm respectively. The 2nd, 3rd and 4th masses revolve in planes 80 mm, 160 mm and 280 mm respectively measured from the plane of the first mass and are angularly located at 60°, 135° and 270° respectively measured clockwise from the first mass looking from this mass end of the shaft. The shaft is dynamically balanced by two masses, both located at 50 mm radii and revolving in planes mid-way between those of 1st and 2nd masses and midway between those of 3rd and 4th masses. Determine, graphically or otherwise, the magnitudes of the	Analytical Problem	**A**

	masses and their respective angular positions.		
7.	A shaft carries five masses A, B, C, D and E which revolve at the same radius in planes which are equidistant from one another. The magnitude of the masses in planes A, C and D are 50 kg, 40 kg and 80 kg respectively. The angle between A and C is 90° and that between C and D is 135°. Determine the magnitude of the masses in planes B and E and their positions to put the shaft in complete rotating balance.	Analytical Problem	**A**

TUTORIAL QUESTIONS:

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
Unit 5 Tutorials Short Answer Questions			
1.	What are the causes and effects of vibrations ?	Knowledge	a
2.	Define, in short, free vibrations, forced vibrations and damped vibrations.	Knowledge	a
3.	Discuss briefly with neat sketches the longitudinal, transverse and torsional free vibrations.	Comprehension	a
4.	Derive an expression for the natural frequency of free transverse and longitudinal vibrations by equilibrium method.	Application	a
5.	Discuss the effect of inertia of the shaft in longitudinal and transverse vibrations.	Comprehension	a
6.	Establish the expression to determine the frequency of torsional vibrations of a geared system.	Comprehension	a
7.	Discuss the effect of inertia of a shaft on the free torsional vibrations.	Knowledge	a
8.	How the natural frequency of torsional vibrations for a two rotor system is obtained?	Analysis	a
9.	Describe the method of finding the natural frequency of torsional vibrations for a three rotor system.	Comprehension	a
10.	What is meant by torsionally equivalent length of a shaft as refereed to a stepped shaft?	Knowledge	a

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 5 **Tutorials** **Long Answer Questions**		
1.	A beam of length 10 m carries two loads of mass 200 kg at distances of 3 m from each end together with a central load of mass 1000 kg. Calculate the frequency of transverse vibrations. Neglect the mass of the beam and take I = 109 mm4 and E = 205×103 N/mm2.	Analytical Problem	**a**
2.	A shaft 1.5 m long is supported in flexible bearings at the ends and carries two wheels each of 50 kg mass. One wheel is situated at the centre of the shaft and the other at a distance of 0.4 m from the centre towards right. The shaft is hollow of external diameter 75 mm and inner diameter 37.5 mm. The density of the shaft material is 8000 kg/m3. The Young's modulus for the shaft material is 200 GN/m2. Find the frequency of transverse vibration.	Analytical Problem	**a**
3.	A shaft 180 mm diameter is supported in two bearings 2.5 metres apart. It carries three discs of mass 250 kg, 500 kg and 200 kg at 0.6 m, 1.5 m and 2 m from the left hand. Assuming the mass of the shaft 190 kg/m, determine the critical speed of the shaft. Young's modulus for the material of the shaft is 211 GN/m2.	Analytical Problem	**a**
4.	A vertical shaft 25 mm diameter and 0.75 m long is mounted in long bearings and carries a pulley of mass 10 kg midway between the bearings. The centre of pulley is 0.5 mm from the axis of the shaft. Find (*a*) the whirling speed, and (*b*) the bending stress in the shaft, when it is rotating at 1700 r.p.m. Neglect the mass of the shaft and E = 200 GN/m2.	Analytical Problem	**a**
5.	The mass of a machine is 100 kg. Its vibrations are damped by a viscous dash pot which diminishes amplitude of vibrations from 40 mm to 10 mm in three complete oscillations. If the machine is mounted on four springs each of stiffness 25 kN/m, find (*a*) the resistance of the dash pot at unit velocity, and (*b*) the periodic time of the damped vibration.	Analytical Problem	**a**

ASSIGNMENT QUESTIONS

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 1		

1.	A flywheel of mass 10 kg and radius of gyration 200 mm is spinning about its axis, which is horizontal and is suspended at a point distant 150 mm from the plane of rotation of the flywheel. Determine the angular velocity of precession of the flywheel. The spin speed of flywheel is 900 r.p.m.	Analytical Problem	
2.	An aeroplane runs at 600 km / h. The rotor of the engine weighs 4000 N with radius of gyration of 1 metre. The speed of rotor is 3000 r.p.m. in anticlockwise direction when seen from rear side of the aeroplane. If the plane takes a loop upwards in a curve of 100 metres radius, find : 1. gyroscopic couple developed; and 2. effect of reaction gyroscopic couple developed on the body of aeroplane.	Analytical Problem	
3.	The turbine rotor of a ship has a mass of 20 tonnes and a radius of gyration of 0.75 m. Its speed is 2000 r.p.m. The ship pitches 6° above and below the horizontal position. One complete oscillation takes 18 seconds and the motion is simple harmonic. Calculate : 1. the maximum couple tending to shear the holding down bolts of the turbine, 2. the maximum angular acceleration of the ship during pitching, and 3. the direction in which the bow will tend to turn while rising, if the rotation of the rotor is clockwise when looking from rear.	Analytical Problem	
4.	A rail car has a total mass of 4 tonnes. There are two axles, each of which together with its wheels and gearing has a total moment of inertia of 30 kg-m2. The centre distance between the two wheels on an axle is 1.5 metres and each wheel is of 375 mm radius. Each axle is driven by a motor, the speed ratio between the two being 1 : 3. Each motor with its gear has a moment of inertia of 15 kg-m2 and runs in a direction opposite to that of its axle. The centre of gravity of the car is 1.05 m above the rails. Determine the limiting speed for this car, when it rounding a curve of 240 metres radius such that no wheel leaves the rail. Consider the centrifugal and gyroscopic effects completely. Assume that no cant is provided for outer rail.	Analytical Problem	
5.	Each road wheel of a motor cycle has a mass moment of inertia of 1.5 kg-m2. The rotating parts of the engine of the motor cycle have a mass moment of inertia of 0.25 kg-m2. The speed of the engine is 5 times the speed of the wheels and is in the same sense. The mass of the motor cycle with its rider is 250 kg and its centre of gravity is 0.6 m above the ground level. Find the angle of heel if the cycle is travelling at 50 km / h and is taking a turn of 30 m radius. The	Analytical Problem	

	wheel diameter is 0.6 m.		

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 2		
1.	An engine flywheel has a mass of 6.5 tonnes and the radius of gyration is 2 m. If the maximum and minimum speeds are 120 r. p. m. and 118 r. p. m. respectively	Analytical Problem	**a**
2.	A vertical double acting steam engine develops 75 kW at 250 r.p.m. The maximum fluctuation of energy is 30 per cent of the work done per stroke. The maximum and minimum speeds are not to vary more than 1 per cent on either side of the mean speed. Find the mass of the flywheel required In a turning moment diagram.	Analytical Problem	**a**
3.		Analytical Problem	**a**
4.	The turning moment diagram for a multicylinder engine has been drawn to a scale of 1 mm = 4500 N-m vertically and 1 mm = 2.4° horizontally. The intercepted areas between output torque curve and mean resistance line taken in order from one end are 342	Analytical Problem	**a**
5.	The turning moment diagram for a four stroke gas engine may be assumed for simplicity to be represented by four triangles	Analytical Problem	**a**

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 3		
1.	A conical pivot supports a load of 20 kN, the cone angle is 120º and the intensity of normal pressure is not to exceed 0.3 N/mm2. The external diameter is twice the internal diameter. Find the outer and inner radii of the bearing surface. If the shaft rotates at 200 r.p.m. and the coefficient of friction is 0.1, find the power absorbed in friction. Assume uniform pressure.	Analytical Problem	**a**
2.	A conical pivot bearing supports a vertical shaft of 200 mm diameter. It is subjected to a load of 30 kN. The angle of the cone is 120º and the coefficient of friction is 0.025. Find the power lost in friction when the speed is 140 r.p.m., assuming **1.** uniform pressure ; and uniform wear.	Analytical Problem	**a**
3.	A multi-disc clutch has three discs on the driving shaft and two on the driven shaft. The outside	Analytical Problem	**a**

	diameter of the contact surfaces is 240 mm and inside diameter 120 mm. Assuming uniform wear and coefficient of friction as 0.3, find the maximum axial intensity of pressure between the discs for transmitting 25 kW at 1575 r.p.m.		
4.	An engine developing 45 kW at 1000 r.p.m. is fitted with a cone clutch built inside the flywheel. The cone has a face angle of 12.5º and a maximum mean diameter of 500 mm. The coefficient of friction is 0.2. The normal pressure on the clutch face is not to exceed 0.1 N/mm2. Determine : **1.** the axial spring force necessary to engage to clutch, and **2.** the face width required.	Analytical Problem	**a**
5.	A band and block brake, having 14 blocks each of which subtends an angle of 15° at the centre, is applied to a drum of 1 m effective diameter. The drum and flywheel mounted on the same shaft has a mass of 2000 kg and a combined radius of gyration of 500 mm. The two ends of the band are attached to pins on opposite sides of the brake lever at distances of 30 mm and 120 mm from the fulcrum. If a force of 200 N is applied at a distance of 750 mm from the fulcrum, find: **1.** maximum braking torque, **2.** angular retardation of the drum, and **3.** time taken by the system to come to rest from the rated speed of 360 r.p.m. The coefficient of friction between blocks and drum may be taken as 0.25.		**a**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
	Unit 4		
1.	In an engine governor of the Porter type, the upper and lower arms are 200mm and 250 mm respectively and pivoted on the axis of rotation. The mass of the central load is 15 kg, the mass of each ball is 2 kg and friction of the sleeve together with the resistance of the operating gear is equal to a load of 25 N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40°, find, taking friction into account, range of speed of the governor.	Analytical Problem	**a**
2.	The following particulars refer to a Proell governor with open arms : Length of all arms = 200 mm ; distance of pivot of arms from the axis of rotation = 40mm ; length of extension of lower arms to which each ball is attached = 100mm ; mass of each ball = 6 kg and mass of the central load = 150 kg. If the radius of rotation of the balls is 180 mm when the arms are inclined at an angle of 40° to the axis of rotation, find	Analytical Problem	**a**

	the equilibrium speed for the above configuration.		
3.	In a spring loaded Hartnell type governor, the extreme radii of rotation of the balls are 80 mm and 120 mm. The ball arm and the sleeve arm of the bell crank lever are equal in length. The mass of each ball is 2 kg. If the speeds at the two extreme positions are 400 and 420 r.p.m., find : **1.** the initial compression of the central spring, and **2.** the spring constant.	Analytical Problem	**a**
4.	A shaft carries four masses in parallel planes A, B, C and D in this order along its length. The masses at B and C are 18 kg and 12.5 kg respectively, and each has an eccentricity of 60 mm. The masses at A and D have an eccentricity of 80 mm. The angle between the masses at B and C is 100° and that between the masses at B and A is 190°, both being measured in the same direction. The axial distance between the planes A and B is 100 mm and that between B and C is 200 mm. If the shaft is in complete dynamic balance, determine :**1.** The magnitude of the masses at A and D ; **2.** the distance between planes A and D ; and **3.** the angular position of the mass at D.	Analytical Problem	**a**
5.	A shaft has three eccentrics, each 75 mm diameter and 25 mm thick, machined in one piece with the shaft. The central planes of the eccentric are 60 mm apart. The distance of the centres from the axis of rotation are 12 mm, 18 mm and 12 mm and their angular positions are 120° apart. The density of metal is 7000 kg/m3. Find the amount of out-of-balance force and couple at 600 r.p.m. If the shaft is balanced by adding two masses at a radius 75 mm and at distances of 100 mm from the central plane of the middle eccentric, find the amount of the masses and their angular positions.		**a**
6.	A shaft is supported in bearings 1.8 m apart and projects 0.45 m beyond bearings at each end. The shaft carries three pulleys one at each end and one at the middle of its length. The mass of end pulleys is 48 kg and 20 kg and their centre of gravity are 15 mm and 12.5 mm respectively from the shaft axis. The centre pulley has a mass of 56 kg and its centre of gravity is 15 mm from the shaft axis. If the pulleys are arranged so as to give static balance, determine : **1.** relative angular positions of the pulleys, and **2.** dynamic forces produced on the bearings when the shaft rotates at 300 r.p.m.	Analytical Problem	**a**

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	Unit 5		
1.	A vertical shaft of 5 mm diameter is 200 mm long and is supported in long bearings at its ends. A disc of mass 50 kg is attached to the centre of the shaft. Neglecting any increase in stiffness due to the attachment of the disc to the shaft, find the critical speed of rotation and the maximum bending stress when the shaft is rotating at 75% of the critical speed. The centre of the disc is 0.25 mm from the geometric axis of the shaft. E = 200 GN/m2.	Analytical Problem	**a**
2.	A vibrating system consists of a mass of 200 kg, a spring of stiffness 80 N/mm and a damper with damping coefficient of 800 N/m/s. Determine the frequency of vibration of the system.	Analytical Problem	**a**
3.	A vibrating system consists of a mass of 400 kg, a spring of stiffness 90 N/mm and a damper with damping coefficient of 700 N/m/s. Determine the frequency of vibration of the system.	Analytical Problem	**a**
4.	The following data are given for a vibratory system with viscous damping: Mass = 2.5 kg ; spring constant = 3 N/mm and the amplitude decreases to 0.25 of the initial value after five consecutive cycles. Determine the damping coefficient of the damper in the system.	Analytical Problem	**a**
5.	An instrument vibrates with a frequency of 1 Hz when there is no damping. When the damping is provided, the frequency of damped vibrations was observed to be 0.9 Hz.		**a**

SUBJECT NAME: MANUFACTURING PROCESS

Syllabus:

UNIT -I: CASTING: Steps involved in making a casting, Advantage of casting and its applications. Patterns and Pattern making, Types of patterns, Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems Solidification of casting, Concept, Solidification of pure metal and alloys, short and long freezing range alloys. Risers Types function and design, special casting processes 1) Centrifugal 2) Die 3) Investment. **METHODS OF MELTING:** Crucible melting and cupola operation, steel making processes.

UNIT –II: WELDING: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. **CUTTING OF METALS:** Oxy Acetylene Gas cutting, water plasma, cutting of ferrous, non-ferrous metals.

UNIT -III: INERT GAS WELDING: TIG and MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering and Brazing. Heat affected zones in welding; welding defects, causes and remedies, destructive, non-destructive testing of welds.

UNIT – IV: HOT WORKING AND COLD WORKING: Strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of cold and hot worked parts.
ROLLING: Fundamentals, theory of rolling, types of Rolling mills and Forces in rolling and power requirements. Stamping, forming and other cold working processes: Blanking and piercing, Bending and forming, Drawing and its types, wire drawing and Tube drawing, coining, Hot and cold spinning Forces and power requirement in the above operations.

UNIT -V: EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion, Forward extrusion and backward extrusion, Impact extrusion, Hydrostatic extrusion. **FORGING PROCESSES:** Principles of forging, Tools and dies, Types Forging, Smith forging, Drop Forging, Roll forging, Rotary forging, forging defects. **PROCESSING OF PLASTICS:** Types of Plastics, Properties, applications and their Processing methods and Equipment (blow and injection modelling).

TEXT BOOKS

1. P. N. Rao (2011), Manufacturing Technology, Vol -1, 3rd edition, Tata McGraw-Hill education (P) Ltd, NewDelhi.
2. S. Kalpakjain (2005), Manufacturing Engineering and Technology, 4th edition, Pearson Education, New Jersey.

REFERENCE BOOKS

1. R. K. Jain (2010), Production Technology, 16th edition, Khanna publishers, New Delhi, India. B. S. Raghuwanshi (2011), A course in workshop Technology, Vol -II, 3rd Edition, Dhanpat Rai & Co, New Delhi, India.
2. Gosh (2004), Manufacturing science, Affiliated East-west press (p) Ltd, New Delhi, India.

COURSE INFORMATION SHEET

PROGRAMME: B.TECH (MECHANICAL ENGINEERING)	DEGREE:B. TECH II
COURSE: MANUFACTURING PROCESSS	SEMESTER:II CREDITS:4
COURSE CODE: REGULATION:**R16**	COURSE TYPE:CORE
COURSE AREA/DOMAIN: PRODUCTION TECHNOLOGY	CLASS HOURS:5 HRS/WEEK

SYLLABUS:

UNIT	DETAILS	HOURS
I	**CASTING:** Steps involved in making a casting, Advantage of casting and its applications. Patterns and Pattern making, Types of patterns, Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems Solidification of casting, Concept, Solidification of pure metal and alloys, short and long freezing range alloys. Risers Types function and design, special casting processes 1) Centrifugal 2) Die 3) Investment. **METHODS OF MELTING:** Crucible melting and cupola operation, steel making processes.	16
II	**WELDING:** Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. **CUTTING OF METALS:** Oxy Acetylene Gas cutting, water plasma, cutting of ferrous, non-ferrous metals.	14
III	**INERT GAS WELDING:** TIG and MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering and Brazing. Heat affected zones in welding; welding defects, causes and remedies, destructive, non-destructive testing of welds.	10
IV	**HOT WORKING AND COLD WORKING:** Strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of cold and hot worked parts. **ROLLING:** Fundamentals, theory of rolling, types of Rolling mills and Forces in rolling and power requirements. Stamping, forming and other cold working processes: Blanking and piercing, Bending and forming, Drawing and its types, wire drawing and Tube drawing, coining, Hot and cold spinning Forces and power requirement in the above operations.	20
V	**EXTRUSION OF METALS:** Basic extrusion process and its characteristics. Hot extrusion and cold extrusion, Forward extrusion and backward extrusion, Impact extrusion, Hydrostatic extrusion. **FORGING PROCESSES:** Principles of forging, Tools and dies, Types Forging, Smith forging, Drop Forging, Roll forging, Rotary forging, forging defects. **PROCESSING OF PLASTICS:** Types of Plastics, Properties, applications and their Processing methods and Equipment (blow and injection modelling).	16
	TOTAL HOURS	**76**

COURSE OBJECTIVES
&
COURSE OUTCOMES

S No.	Course Objectives	Course Outcomes	Blooms Level
1	Practical Orientation of Manufacturing Process	Ability to contrast different types of manufacturing process and apply technology systems model to manufacturing identity, illustrate, solve, formulate, distinguee and compare different working process.	BL 1
2	Knowledge on different kinds of production process and practises available for shaping or moulding several daily used parts for industries	Ability to understand design of systems components to meet the desired meets within realistic constraints such as manufacturability, economic, environmental, safety and sustainability etc….	BL 1
3	Classify equipment selection for various manufacturing process will be understood	Recognize to acquire the knowledge about the modern manufacturing process	BL 3
4	Understand and illustrate equipment selection for various deformation process will be understood	Ability to gain knowledge on product manufacturing process	BL 4
5	Understand various methods to use to produce plastic shapes	Ability to know about latest fabrication technologies and capability to get ideas for product establishment as an entrepreneur	BL 5

BLOOMS LEVEL (BL)

BL 1: Remember / knowledge BL2: Understanding BL3: Apply

BL 4: Analyse BL 5: Evaluate BL 6: Create

Model Lesson Plan

Lecture No.	Blooms Level	Course Learning Outcomes	Topics to be covered	Course Learning Outcome
1	L1	Define casting	**Casting-** Introduction to casting process, Steps involved in making casting. http://nptel.ac.in/courses/112107145/21	a, b, c, e
	L3	Illustrate the process of casting		a, b, d, e
2	L1	List out the terminology used in casting	Advantages and Applications of Casting, Patterns http://nptel.ac.in/courses/112107144/metalcasting/lecture1.htm	c
	L6	Categorize the applications of casting		a, c
3	L2	Explain types of patterns	Types of Patterns http://nptel.ac.in/courses/112107144/17	a, b, c
	L3	Point out the types of patterns		a, b, c, d
4	L1	Define pattern allowance	Pattern allowances and their construction http://nptel.ac.in/courses/112107144/15	a, b
5	L2	Discuss different types of casting processes	Types of Casting Processes http://nptel.ac.in/courses/112107145/21	a, b, c
	L4	Differentiate the types of casting processes		a, b, c, d
6	L2	Explain sand casting	Sand Casting http://nptel.ac.in/courses/112107144/metalcasting/lecture2.htm	a, b, c
	L6	Specify the applications of sand casting		a, b, c, d
7	L2	Explain investment casting	Investment Casting http://nptel.ac.in/courses/112107144/metalcasting/lecture8.htm	a, b, c
	L6	Specify the applications of investment casting		a, b, c, d

8	L2	Explain die casting	Die Casting http://nptel.ac.in/courses/107103012/module2/lec3.pdf	a, b, c
	L6	Specify the applications of die casting		a, b, c, d
9	L1	Describe about centrifugal casting	Centrifugal Casting http://nptel.ac.in/courses/112107144/metalcasting/lecture7.htm	a, b, c
	L6	Specify the applications of centrifugal casting		a, b, c, d
10	L1	Describe about continuous casting	Continuous Casting	a, b, c
	L6	Specify the applications of continuous casting		a, b, c, d
11	L1	Describe about solidification	Solidification of Casting http://nptel.ac.in/courses/113104059/lecture_pdf/Lecture%2031.pdf	a, b
	L6	Explain briefly solidification of casting		a, b
12	L1	Define welding	**Welding-** Welding Types http://nptel.ac.in/courses/112107089	a, b, c
	L3	Classify the welding types		a, b, c, d
13	L2	Discuss about oxy-fuel gas cutting	Oxy-fuel Gas Cutting http://web.iitd.ac.in/~pmpandey/MEL120_html/Welding%20and%20Allied%20Processes.pdf	a, b, c
	L6	Specify the applications of oxy-fuel gas cutting		a, b, c, d

Objective Questions

1. Work study is concerned with

(a) improving present method and finding standard time

(b) motivation of workers

(c) improving production capability

(d) improving production planning and control

(e) all of the above.

Ans: a

2. Basic tool in work study is

(a) graph paper

(b) process chart

(c) planning chart

(d) stop watch

(e) analytical mind. Ans: d

3. What does symbol 'O' imply in work study

(a) operation

(b) inspection

(c) transport

(d) delay/temporary storage

(e) none of the above.

Ans: a

4. What does symbol 'D' imply in work study

(a) inspection

(b) transport

(c) delay/temporary storage

(d) permanent storage

(e) none of the above.

Ans: c

5. What does symbol 'V' employ in work study

(a) operation

(b) inspection

(c) delay/ temporary Storage

(d) permanent storage

(e) none of the above. Ans: d

6. Material handling in automobile industry is done by

(a) overhead crane

(b) trolley

(c) belt conveyor
(d) all of the above

(e) none of the above. Ans: a

7. String diagram is used when

(a) team of workers is working at a place

(b) material handling is to be done

(c) idle time is to be reduced

(d) all of the above

(e) none of the above.

Ans: a

8. Work study is most useful

(a) where production activities are involved

(b) in judging the rating of machines

(c) in improving industrial relations

(d) in judging the output of a man and improving it

(e) where men are biggest contributor to success of a project. Ans: a

9. Micromotion study is

(a) enlarged view of motion study

(b) analysis of one stage of motion study

(c) minute and detailed motion study

(d) subdivision of an operation into therbligs and their analysis

(e) motion study of small components upto mirco-seconds. Ans: d

10. In micromotion study, therblig is described by

(a) a symbol

(b) an event

(c) an activity

(d) micro motions

(e) standard symbol and colour.

Ans: e

11. The allowed time for a job equals standard time plus

(a) policy allowance

(b) interference allowance

(c) process allowance

(d) learning allowance

(e) unforeseen allowance. Ans: a

12. Micromotion study involves following number of fundamental hand motions

(a) 8

(b) 12

(c) 16

(d) 20

(e) 24

Ans: c

13. The standard time for a job is

(a) total work content

(b) base time + relaxation time

(c) total work content + basic time

(d) total work content + delay contingency allowance

(e) total work content + relaxation time. Ans: d

14. Work study is done with the help of

(a) process chart

(b) material handling

(c) stop watch

(d) all of the above

(e) none of the above. Ans: c

15. Scheduling gives information about

(a) when work should start and how much work should be completed during a certain period

(b) when work should complete

(c) that how idle time can be minimized

(d) proper utilisation of machines

(e) none of the above.

Ans: a

16. Expediting function consists in keeping a watch on

(a) operator's activity

(b) flow of material and in case of trouble locate source of trouble

(c) minimising the delays

(d) making efficient despatching

(e) none of the above. Ans: b

17. Choose the wrong statement Time study is used to

(a) determine overhead expenses

(b) provide a basis for setting piece prices or incentive wages

(c) determine standard costs

(d) determine the capability of an operator to handle the number of machines

(e) compare alternative methods. Ans: a

18. Job evaluation is the method-of determining the

(a) relative worth of jobs

(b) skills required by a worker

(c) contribution of a worker

(d) contribution of a job

(e) effectiveness of various alternatives. Ans: a

19. Micromotion study is

(a) analysis of a man-work method by using a motion picture camera with a timing device in the field of view

(b) motion study* observed on enhanced time intervals

(c) motion study of a sequence of operations conducted systematically

(d) study of man and machine conducted simultaneously

(e) scientific, analytically procedure for determining optimum work method.

Ans: a

20. Per cent idle time for men or machines is found by

(a) work sampling

(b) time study

(c) method study

(d) work study

(e) ABC analysis. Ans: a

21. TMU in method time measurement stands for

(a) time motion unit

(b) time measurement unit

(c) time movement unit

(d) technique measurement unit

(e) time method unit.

Ans: b

22. Time study is

(a) the appraisal, in terms of time, of the value of work involving human effort

(b) machine setting time

(c) time taken by workers to do a job

(d) method of fixing time for workers

(e) method of determining the personnel Requirement.

Ans: a

23. Work sampling observations are taken on the basis of

(a) detailed calculations

(b) convenience

(c) table of random numbers

(d) past experience

(e) fixed percentage of daily production. Ans: c

24. One time measurement unit (TMU) in method time measurement system equals

(a) 0.0001 minute

(b) 0.0006 minute

(c) 0.006 minute

(d) 0.001 minute

(e) 0.06 minute. Ans: b

25. Basic motion time study gives times for basic motions in ten thousandths of

(a) second

(b) minute

(c) hour

(d) day

(e) none of the above. Ans: b

26. Choose the wrong statement. Motion study is used for

(a) improving a work method

(b) improvising a work method

(c) designing a work method

(d) providing a schematic framework

(e) reducing inventory costs.
Ans: e

27. Gnatt chart provides information about the

(a) material handling

(b) proper utilisation of manpower

(c) production schedule

(d) efficient working of machine

(e) all of the above. Ans: c

28. ABC analysis deals with

1. analysis of process chart

2. flow of material

3. ordering schedule of job

4. controlling inventory costs money

5. all of the above.

Ans: d

29. Process layout is employed for

6. batch production

7. continuous type of product

8. effective utilisation of machines

9. all of the above

10. none of the above.

Ans: a

4. For a product layout the material handling equipment must

(a) have full flexibility

(b) employ conveyor belts, trucks, tractors etc.

(c) be a general purpose type

(d) be designed as special purpose for a particular application

(e) arranging shops according to specialization of duties. Ans: d

5. Travel charts provide

5. an idea of the flow of materials at various stages

6. a compact estimate of the handling which must be done between various work sections

7. the information for changes required in rearranging material handling equipment

8. an approximate estimate of the handling which must be done at a particular station

3. solution to handling techniques to achieve most optimum^ results.

Ans: b

5. Product layout is employed for

(a) batch production

(b) continuous production

(c) effective utilization of machine

(d) all of the above

(e) none of the above. Ans: b

6. The most important objective behind plant layout is

(a) overall simplification, safety of integration

(b) economy in space

(c) maximum travel time in plant

(d) to provide conveniently located shops

(e) to avoid any bottlenecks.

Ans: a

34. The process layout is best suited where

(a) specialisation exists

(b) machines are arranged according to sequence of operation

(c) few number of non-standardised units are to be produced

(d) mass production is envisaged

(e) bought out items are more. Ans: c

35. A low unit cost can be obtained by following

(a) product layout

(b) functional layout

(c) automatic material handling equipment

(d) specialisation of operation

(e) minimum travel time plan and com¬pact layout. Ans: a

36. Military organisation is known as

(a) line organisation

(b) line and staff organisation

(c) functional organisation

(d) all of the above

(e) none of the above. Ans: a

37. The main disadvantage of line organisation is

(a) top level executives have to do excessive work

(b) structure is rigid

(c) communication delays occur

(d) all of the above

(e) none of the above. Ans: d

38. The main advantage of line organisation is its

(a) effective command and control

(b) defined responsibilities at all levels

(c) rigid discipline in the organisation

(d) ability of quick decision at all levels

(e) all of the above. Ans: e

39. Frederick W. Taylor introduced a system of working known as

(a) line organisation

(b) line and staff organisation

(c) functional organisation

(d) effective organisation

(e) none of the above. Ans: c

40. The salient feature of functional organisation is

(a) strict adherence to specification

(b) separation of planning and design part

(c) each individual maintains functional efficiency

(d) work is properly planned and distributed

(e) all of the above.

Ans: e

41. The most popular type of organisation used for Civil Engineering Constructions is

(a) line organisation

(b) line and staff organisation

(c) functional organisation

(d) effective organisation

(e) none of the above.

Ans: a

42. Templates are used for

(a) a planning layout

(b) flow of material

(c) advancing a programme in automatic machines

(d) copying complicated profiles

(e) none of the above. Ans: a

43. In steel plant the most important system for materials handling is

(a) conveyors

(b) cranes and hoists

(c) trucks

(d) locos

(e) none of the above. Ans: d

44. Routing prescribes the

(a) flow of material in the plant

(b) proper utilization of man power

(c) proper utilization of machines

(d) inspection of final product

(e) none of the above.

Ans: a

45. Queuing theory deals with problems of

(a) material handling

(b) reducing the waiting time or idle Jajme

(c) better utilization of man services

(d) effective use of machines

(e) none of the above. Ans: b

46. Standard time is defined as

(a) normal time + allowances

(b) normal time + idle time + allowances

(c) normal time + idle time

(d) only normal time for an operation

(e) none of the above.

Ans: a

47. Father of industrial engineering is

(a) Jeck Gilberth

(b) Gnatt

(c) Taylor

(d) Newton

(e) none of the above. Ans: b

48. The grouping of activities into organisational units is called

(a) corporate plans

(b) higher level management

(c) functional authority

(d) departmentatidn

(e) company policy. Ans: d

49. Which of the following organisation is preferred in automobile industry

(a) functional organisation

(b) line organisation

(c) staff organisation

(d) line and staff organisations

(e) scalar organisation.

Ans: d

50. Which of the following organisations is best suited for steel plants

(a) functional organisation

(b) line organisation

(c) staff organisation

(d) line, staff and functional organisations

(e) scalar organisation. Ans: d

51. The wastage of material in the store is taken into account by the following method in the evaluation of the material issued from the store
(a) inflated system

(b) primary cost method

(c) current value method

(d) fixed price method

(e) variable price method. Ans: a

52. Which of the following is independent of sales forecast

(a) productivity

(b) inventory control

(c) production planning

(d) production control

(e) capital budgeting. Ans: a

53. Gnatt charts are used for

(a) forecasting sales

(b) production schedule

(c) scheduling and routing

(d) linear programming

(e) none of the above. Ans: b

54. Inventory management consists of

(a) effective running of stores

(b) state of merchandise methods of stroing and maintenance etc.

(c) stock control system

(d) all of the above

(e) none of the above. Ans: d

55. Gnatt charts provide information about

(a) break even point analysis

(b) production schedule

(c) material handling layout

(d) determining selling price

(e) value analysis. Ans: b

56. Inventory control in production, planning and control aims at

(a) achieving optimisation

(b) ensuring against market fluctuations

(c) acceptable customer service at low capital investment in inventory

(d) discounts allowed in bulk purchase

(e) regulate supply and demand.

Ans: c

57. In inventory control, the economic order quantity is the

(a) optimum lot size

(b) highest level of inventory

(c) lot corresponding to break-even point

(d) capability of a plant to produce

(e) none of the above. Ans: a

58. Statistical quality control techniques are based on the theory of

(a) quality

(b) statistics

(c) probability

(d) all of the above

(e) none of the above.

Ans: c

59. The appellate authority for an industrial dispute is

(a) management

(b) labour court

(c) high court/supreme court

(d) board of directors

(e) president.

Ans: c

60. Under the Apprenticeship Act

(a) all industries have to necessarily train the apprentices

(b) industries have to train apprentices ac-cording to their requirement

(c) all industries employing more than 100 workers have to recruit apprentices

(d) only industries employing more than 500 workers have to recruit apprentices

(e) all industries other than small scale industries have to train apprentices. Ans: d

61. Standing orders which are statutory are applicable to

(a) all industries

(b) all process industries and thermal power plants

(c) only major industries

(d) only key industries

(e) all industries employing more than 100 workers. Ans: e

62. Acceptance sampling is widely used in

(a) batch production

(b) job production

(c) mass production

(d) all of the above

(e) none of the above. Ans: c

63. The technique of value analysis can be applied to

(a) complicated items only

(b) simple items only

(c) crash programmer items only

(d) cost consciousness items only

(e) any item. Ans: e

64. The term 'value' in value engineering refers to

(a) total cost of the product

(b) selling price of the product

(c) utility of the product

(d) manufactured cost of the product

(e) depreciation value. Ans: c

65. Value engineering aims at finding out the

(a) depreciation value of a product

(b) resale value of a product

(c) major function of the item and accomplishing the same at least cost without change in quality

(d) break even point when machine re-quires change

(e) selling price of an item.

Ans: c

66. In the perpetual inventory control, the material is checked when it reaches its

(a) minimum value

(b) maximum value

(c) average value

(d) alarming value

(e) original value. Ans: a

67) According to MAPI formula, the old machine should be replaced by new one when

(a) CAM < DAM

(b) CAM > DAM

(c) CAM = DAM

(d) there is no such criterion

(e) none of the above.

(CAM = Challenger's Adverse minimum DAM = Defender's Adverse minimum)

Ans: a

68. Merit Rating is the method of determining worth of

(a) a job

(b) an individual employee

(c) a particular division in workshop

(d) machine

(e) overall quality. Ans: b

69. Material handling and plant location is analysed by

(a) Gnatt chart

(b) bin chart

(c) Emerson chart

(d) travel chart

(e) activity chart. Ans: d

70. Works cost implies

(a) primary cost

(b) factory cost

(c) factory expenses

(d) primary cost + factory expenses

(e) none of the above.

Ans: d

71. Motion study involves analysis of

(a) actions of operator

(b) layout of work place

(c) tooling and equipment

(d) all of the above

(e) none of the above.

Ans: a

72. Standard time as compared to normal time is

(a) greater

(b) smaller

(c) equal

(d) there is no such correlation

(e) none of the above.

Ans: a

73. Pick up the incorrect statement about advantages of work sampling

(a) permits a fine breakdown of activities and delays

(b) simultaneous study of many operators may be made by a single observer

(c) calculations are easier, method is economical and less time consuming

(d) no time measuring devices are generally needed

(e) as operators are not watched for long periods, chances of obtaining misleading results are less.

Ans: a

74. In which of the following layouts, the lines need to the balanced

(a) process layout

(b) product layout

(c) fixed position layout

(d) plant layout

(e) functional layout. Ans: b

75. Which of the following layouts is suited for mass production

(a) process layout

(b) product layout

(c) fixed position layout

(d) plant layout

(e) functional layout. Ans: b

76. Which of the following layouts is suited to job production

(a) process layout

(b) product layout

(c) fixed position layout

(d) plant layout

(e) functional layout. Ans: a

77. The employees provident fund act is applicable to

(a) all industries

(b) all industries other than small and medium industries

(c) volunteers

(d) the industries notified by Government

(e) all major industries.

Ans: d

78. The amount deducted from the salary of workers towards employees provident fund is

(a) credited into reserves of company

(b) deposited in nationalised bank

(c) deposited in post office

(d) deposited in the account of worker with employer or Reserve Bank of India

(e) deposited in the account of worker with Provident Fund Commissioner. Ans: e

79. The deductions for, employees provident fund start

(a) immediately on joining the service

(b) after 60 days of joining the service

(c) after 100 days of joining the service

(d) after 240 days of joining the service

(e) after one year of joining the service. Ans: d

80. Father of time study was

(a) F.W. Taylor

(b) H.L. Gantt

(c) F.B. Gilberfh

(d) R.M. Barnes

(e) H.B. Maynord. Ans: a

81. Tick the odd man out

(a) Taylor

(b) Drucker

(c) McGregor

(d) Galileo

(e) Parkinson. Ans: d

82. Current assets include

(a) manufacturing plant

(b) manufacturing plant and equipment

(c) inventories

(d) common stock held by the firm

(e) all of the above. Ans: a

83. The objective of time study is to determine the time required to complete a job by

(a) fast worker

(b) average worker

(c) slow worker

(d) new entrant

(e) any one of the above. Ans: b

84. Job enrichment technique is applied to

(a) reduce labour monotony

(b) overcome boring and demotivating work

(c) make people happy

(d) all of the above

(e) none of the above.

Ans: d

85. For ship vessel industry the following layout is best suited

(a) process layout

(b) product layout

(c) fixed position layout

(d) plant layout

(e) functional layout. Ans: c

86. In Halsey 50-50 plan, output standards are established

(a) by time study

(b) from previous production records

(c) from one's judgement

(d) all of the above

(e) none of the above. Ans: b

87. Routing is essential in the following type of industry

(a) assembly industry
(b) process industry

(c) job order industry

(d) mass production industry

(e) steel industry.

Ans: a

88. An optimum project schedule implies

(a) optimum utilization of men, machines and materials

(b) lowest possible cost and shortest possible time for project

(c) timely execution of project

(d) to produce best results under given constraints

(e) realistic execution time, minimum cost and maximum profits. Ans: b

89. Graphical method, simplex method, and transportation method are concerned with

(a) break-even analysis

(b) value analysis

(c) linear programming

(d) queing theory

(e) tnaterial handling. Ans: c

90. Which one of the following represents a group incentive plan ?

(a) Scanlon Plan

(b) Rowan Plan

(c) Bedaux Plan

(d) Taylor Differential Piece Rate System

(e) Halsey Premium Plan. Ans: a

91. In the Halsey 50-50 plan, the following are rewarded more

(a) past good workers

(b) past poor workers

(c) past average workers

(d) all of the above

(e) none of the above. Ans: b

92. In the Halsey system of wage incentive plan, a worker is

(a) paid as per efficiency

(b) ensured of minimum wages

(c) not paid any bonus till his efficiency

(d) never a loser

(e) induced to do more work.

Ans: b

93. 'Value' for value engineering and analysis purposes is defined as

(a) purchase value

(b) saleable value

(c) depreciated value

(d) present worth

(e) function/cost. Ans: e

94. Break-even analysis can be used for

(a) short run analysis

(b) long run analysis

(c) average of above two run analysis

(d) there is no such criterion

(e) none of the above. Ans: a

95. CPM has following time estimate

(a) one time estimate

(b) two time estimate

(c) three time estimate

(d) four time estimate

(e) nil time estimate. Ans: a

96. PERT has following time estimate

(a) one time estimate

(b) two time estimate

(c) three time estimate

(d) four time estimate

(e) nil time estimate. Ans: c

97. In Lincoln plan (one type of group incentive plan), the amount of the profit which an .employee receives in addition to the guaranteed basic pay/wages, is based on :
(a) a standard rating system
(b) a merit rating system

(c) a job evaluation system

(d) his individual performance

(e) all of the above.

Ans: b

98. Which of the following incentive plansrensures a part of the swing to the worker and rest to the employer

(a) Emerson efficiency plan

(b) Taylor plan

(c) Halsey premium plan

(e) Gilberth plan. Ans: c

99. Which of the following is not wage incentive plan

(a) differential piece rate system

(b) Rowan plan

(c) Emerson plan

(d) Taylor plan

(e) Halsey plan. Ans: d

100. Which of the following plans motivates supervisors by paying a premium on time saved by workers

(a) Halsey plan

(b) Rowan plan

(c) Haynes plan

(d) Emerson's plan

(e) Taylor's plan. Ans: c

101. The time required to complete a task is established and a bonus is paid to the worker for every hour he saves from the established time required. This type of incentive plan is known as
(a) Rowan Plan

(b) Bedaux Plan

(c) Taylor Differential Piece rate system

(d) Halsey Premium plan

(e) Day work plan. Ans: d

102. One of the basic essentials of an incentive plan is that

(a) a differential piece rate system should exist

(b) minimum wages should be guaranteed

(c) provide incentive to group efficiency performance

(d) all standards should be based on optimum standards of production

(e) all standards should be based on time studies.

Ans: e

103. In the Emerson efficiency plan, a worker receives only his daily wage and no bonus is paid till his efficiency reaches

(a) 50%

(b) 661%

(c) 75%

(d) 80%

(e) 90%. Ans: b

104. According to Rowan plan, if H = hourly rate, A = actual time and S = standard time, then wages will be

(a) HA

(b) HA + (S~A) HA

(c) HA + ^^-H

(d) HA + ^^-H

(e) HA + ^^-HA. Ans: b

105. If a worker gets a daily wage of Rs HA, then according to Rowan plan, his maximum daily earnings can be

(a) 2 HA

(b) 1.33 HA

(c) 1.5 HA

(d) 1.15 HA

(e) 2.5 HA. Ans: a

(a) In A-B-C co
106. ntrol policy, maximum attention is given to

(b) those items which consume money

(c) those items which are not readily available

(d) those x items which are in more demand

(e) those items which consume more money

(f) proper quality assurance program-mes.

Ans: d

Unit Wise Question Bank

Sl.No	Questions	Blooms Taxonomy Level	Course Outcome
	Unit-I **Short Answer Questions**		
1	Explain the different methods of casting?	Knowledge	**a**
2	Define casting?	Knowledge	**a**
3	Briefly explain the applications of castings?	Knowledge	**a**
4	Define Foundry ?.Describe about Foundry Layout.	Knowledge	**a**
5	Define pattern?	Knowledge	**a**
6	Explain on what basis Pattern Material is selected ?.	Application	**a**
7	Illustrate the defects in casting?	Knowledge	**a**
8	Explain about different types of patterns?	Knowledge	**a**
9	Define shrinkage allowance?	Knowledge	**a**
10	Determine the different types of allowances?	Analysis	**a**
	Unit-I **Long Answer Questions**		
1	Describe the steps involved in casting.	Analyze	**a**
2	Describe the advantages of casting over methods. Briefly explain the applications of castings?	Understand	**a**
3	What is Foundry ?.Describe about Foundry Layout	Knowledge	**a**
4	Define Pattern ? Describe types of Patterns	Evaluation	**a**
5	How furnaces are classified? Explain crucible melting process	Evaluation	**a**
6	Explain about Cupola Furnace, operations and reactions that take place inside the furnace.	Analyze	**c**
7	Illustrate the defects in casting?How defects are rectified in castings	Evaluation	**a**
8	Define allowances? What are the different types of allowances?	knowledge	**a**
9	Explain on what basis Pattern Material is selected	Evaluation	**c**
10	Elaborate the principle of gating? What are the types of gates?	Analyze	**c**
	Unit-II **Short Answer Questions**		
1	Define welding?	Remember	**a**
2	List the classification of weldings?	Knowledge	**a**

3	Define weld joints?	Remember	**c**
4	Sketch different types of weld joints?	Create	**d**
5	Explain the factors affecting the heat affected zone?	Analyze	**c**
6	Define ARC welding. Explain in detail	Evaluate	**a**
7	State the classification of weldings?	Remember	**c**
8	Describe the basic requirements of welding?	Apply	**d**
9	Define ARC blow in arc welding?	Remember	**c**
10	Explain about forge welding and its application.	Create	**d**
Unit-II Long Answer Questions			
1	Explain the working of a welding process?	Understand	**b**
2	Define welding?What are the basic requirements of welding?	Apply	**c**
3	Explain any two methods ofwelding?	Understand	**a**
4	Explain about thermit welding?	Knowledge	**a**
5	Explain about resistance welding?	Understand	**a**
6	Derive an expression for resistance welding?	Create	**d**
7	Write about forge welding and its application	Understand	**b**
8	Write about resistance welding and its application.	Knowledge	**b**
9	Explain What is thermit welding? Explain its applications.	Understand	**b**
Unit-III Short Answer Questions			
10	Explain in detail about ARC welding?	Knowledge	**b**
1	Brief about inert gas welding?	Remember	**c**
2	Define shielded metal arc welding?	Create	**d**
3	Define TIG welding?	Analyze	**c**
4	Define MIG welding	Analyze	**c**
5	Define friction welding?	Understand	**b**
6	Define induction welding?	Evaluate	**a**
7	Define explosive welding?	Understand	**a**
8	Abbreviate laser? How it is generated?	Remember	**c**
9	Define soldering? Explain its working principle?	Analyze	**d**
10	Define brazing? Explain its working principle?	Remember	**c**
Unit-III Long Answer Questions			
1	Define inert gas welding? How it is different from shielded metal arc welding?	Understand	**a**
2	Define TIG welding? Describe its processes with figure.	Understand	**a**
3	Define MIG welding? Describe its processes with figure	Understand	**a**

4	Define friction welding? Describe its processes with figure.	Understand	**a**
5	Define induction welding? Describe its processes with figure.	Apply	**c**
6	Describe the process of explosive welding.	Apply	**c**
7	Describe the process of laser welding.	Create	**d**
8	Define laser? How it is generated?	Create	**d**
9	Explain the principle and working of laser welding?	Remember	**c**
10	Write about soldering, brazing and braze welding.	Understand	**b**
	Unit-IV **Short Answer Questions**		
1	Explain hot working and cold working processes.	Apply	**c**
2	Differentiate the properties of hot worked and cold worked products.	Understand	**b**
3	Write about the theory of rolling.	Remember	**c**
4	Write about forces in rolling and power requirements.	Understand	**b**
5	Describe the processes of Blanking and Piercing.	Remember	**b**
6	Describe bending and forming operations.	Remember	**b**
7	Describe wire drawing process with neat figure.	Analyze	**c**
8	Define tube drawing.	Remember	**c**
9	Explain the types of presses?	Understand	**b**
10	differentiate between blanking and piercing?	Apply	**c**
	Unit-IV **Long Answer Questions**		
1	Describe briefly about drawing processes, wire drawing process?	Understand	**b**
2	Write short notes about coining, stamping	Understand	**b**
3	What are the various presses? How they are classified?	Understand	**b**
4	Derive the formula for forces required to draw wire drawing process?	Apply	**c**
5	How mechanical properties of material of cold worked parts differ from hot worked pats?	Apply	**c**
6	How tube drawing is performed, describe with figure?	Create	**d**
7	Write differences between hot spinning and cold spinning?	Apply	**c**
8	Describe coining, hot spinning and cold spinning processes.	Create	**d**
9	Differentiate the properties of hot worked and cold worked products.	Create	**d**
10	Describe the processes of Blanking and Piercing.	Evaluate	**c**

Unit-V **Short Answer Questions**			
1	Illustrate the equipments used in extrusion?	Remember	**c**
2	Define extrusion?	Understand	**b**
3	Mention the applications of extrusion process?	Apply	**c**
4	Describe hot extrusion?	Create	**d**
5	Describe cold extrusion?	Remember	**c**
6	What are the limitations of hydrostatic extrusion?	Remember	**c**
7	Briefly explain about hot extrusion?	Create	**d**
8	Briefly explain about cold extrusion?	Evaluate	**c**
9	Write about forging	Analyze	**c**
10	Brief the components used in forging?	Remember	**c**
Unit-V **Long Answer Questions**			
1	Describe about forces and power requirements in presses..	Remember	**c**
3	Differentiate hot extrusion and cold extrusion.	Understand	**b**
4	Describe forward extrusion and backward extrusion.	Understand	**b**
5	Write about impact extrusion.	Understand	**b**
6	How tubes and pipes are made by extrusion process?	Understand	**b**
7	Write about hydro static extrusion and its limitations.	Apply	**d**
8	Write about forging and forging tools..	Understand	**b**
9	Write about Smith forging , drop forging and roll forging.	Apply	**d**
10	Describe various forging hammers.	Remember	**c**

SUBJECT NAME: FLUID MECHANICS AND HYDRAULLIC MACHINES

Syllabus:

FLUID PROPERTIES AND FLUID STATICS: Density, Specific weight, Specific gravity, viscosity, Vapourpressure, compressibility, Surface tension Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydro static law, Piezometer, Simple and differential manometers, pressure gauges, total pressure and center of pressure plane, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT – 2: FLUID KINEMATICS: Stream line, path line, streak line, stream tube, classification of
flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrotational flows, one, two and three dimensional flows, Continuity equation in 3D flow, stream function, velocity potential function.
FLUID DYNAMICS: Surface and Body forces, Euler's and Bernoulli's equation derivation, Navier stokes equation (explanation only), Momentum equation - applications, Vortex Free and Forced. Forced vortex with free surface.

UNIT – 3: SIMILITUDE AND FLOW MEASUREMENT: Flow through venturimeter and orifice
meter, flow through notches and weirs Viscometers hot weir anenomometers, pitot tube flow through nozzles, Characteristics of real fluids.
REYNOLDS EXPERIMENT: Darcy's equation, Minor losses - pipes in series, pipes in parallel, total energy line and hydraulic gradient line, numerical problems.
BOUNDARY LAYER CONCEPTS: Definition, thicknesses, characteristics along thin plate, laminar and turbulent layers (No Derivation) boundary layer in transition, separation of boundary layer submerged objects drag and lift.

UNIT –4: IMPACT OF WATER JETS: Hydrodynamic force of jets on stationary and moving
striking centrally and a tip-velocity triangles at inlet and outlet expressions for work done and efficiency , angular momentum principle, applications to radial flow turbines, Jet propulsion of ships.
HYDRAULIC TURBINES: Overshot and undershot water wheels, classification of Water turbines, Pelton Wheel, work done and working proportions, Francis, Kaplan and propeller turbines, work done and working proportions, draft tubes, types.
PERFORMANCE OF TURBINES: Performance under unit head, unit quantities, performance under specific conditions, specific speed, performance characteristic curves, model testing of turbines, cavitation governing of turbines, surge tanks. Water hammer.

UNIT – 5: CENTRIFUGAL PUMPS: Types Component parts and working, work done by the
impeller, Manometric head losses and efficiencies, effect of vane angle on

manometric efficiency, effect of finite number of vanes of the impeller on head on efficiency, minimum starting speed, loss of head due to reduced or increased flow, diameters of impeller and pipes

RECIPROCATING PUMPS: Main components and working of a reciprocating pump, types of reciprocating pumps, power required driving the pump, coefficient of discharge and slipping indicator diagram, effect of acceleration head in suction and delivery pipes, effect

of friction, maximum vacuum pressure, work saved by air vessels, rate of flow into and from air vessels, pump duty.

TEXT BOOKS:

1. P. N. Modi, S. M. Seth (2011), *Hydraulics and fluid mechanics including hydraulic machines*, 18th revised edition Standard Book House, India.
2.Yumus A. Cengel, John M. Cimbala (2010), *Fluid Mechanics (SI Units),* 2nd edition, Tata McGraw hill education (P) Ltd, New Delhi, India.

REFERENCE BOOKS:

1.R. K. Bansal (2011), *A Textbook of Fluid Mechanics and Hydraulic Machines*, 10th edition, Laxmi Publications, New Delhi, India.
2.Frank M. White (2011), *Fluid Mechanics*, 7th edition, Tata McGraw Hill, New Delhi, India.
3.John F. Dauglas (2005), Fluid *Mechanics*, 5th edition, Pearson Education Limited, New Delhi, India

Course Information Sheet

Course Code	**A2ME09**			
Course Title	Fluid Mechanics & Hydraulic Machinery			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3	1	-	4
Team of Instructors	Ms.k.vijayasree, Assistant Professor			

COURSE OBJECTIVES
&
COURSE OUTCOMES

Sl. No.	Course Objectives	Course Outcomes	Blooms Level
1	To understand the basic Principles of fluid mechanics.	Able to explain the effects of fluid properties on a flow system	BL 1
2	To identify various types of flows	Able to identify type of fluid flow patterns and describe continuity equation	BL 2
3	To analyse real fluid flow and flow measurement	To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design	BL 3
4	To understand boundary layer concepts and flow through pipes	Able to demonstrate boundary layer concepts	BL 4
5	To evaluate the performance of hydraulic turbines	To select and analyze an appropriate turbine with reference to given situation in power plants	BL 5
6	To understand the functioning and characteristic curves of pumps	To estimate performance parameters of a given Centrifugal and Reciprocating pump	BL 6

BLOOMS LEVEL (BL)
BL 1: Remember / knowledge BL2: Understanding BL 3: Apply
BL 4: Analyze BL 5: Evaluate BL 6: Create

Sl. No	Topics in JNTU syllabus	Modules and Sub Modules	Lecture No.	Suggested Books	Remarks
		UNIT-I			
1	Fluid statics: Dimensions and units,	Objective and Relevance Development of hydraulics and fluid mechanics Physical Quantities, Dimensions and Units & System of Units	L1	T1-Ch1 R5-Ch1 R6-CH1	
2.	Physical properties of fluids specific gravity, viscosity	Specific Density, Specific Weight, Specific volume & Specific Gravity Numerical problems	L2 L 3	T1-Ch R5-Ch R6-Ch1T1-Ch R5-Ch R6-Ch1	
3	Atmospheric gauge and vacuum pressure, Surface tension vapor pressure and their influence on fluid motion	Atmospheric, absolute, gauge and vacuum pressures, Surface tension and vapour pressure	L 4	T1-Ch2 R5-Ch2 R6-Ch2	
4.	Measurement of pressure with Piezometer, U-tube and differential manometers	Pressure measuring devices, Piezometernumerical problems Simple U-tube manometer Differential U-tube manometer Numerical problems on differential U-tube manometers	L 5 L 6 L 7	T1-Ch2 R5-Ch2 R6,-Ch2 T1-Ch2 R5-Ch2 R6-Ch2 T1-Ch2 R5-Ch2	
		UNIT-II			
5	Steady and unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows	Objective of the unit Velocity function (Lagrangian and Eulerian approach), classification of flows-steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational	L 8	T1-Ch6 R5-Ch4 R6-Ch5	
6	Stream line, path line and streak lines and	Definitions Differential equation of a streamline	L9	T1-Ch6 R5-Ch4 R6-Ch5	
7	Equation of continuity for one dimensional flow	Law of conservation of mass Derivation of continuity equation	L 10 L11	T1-Ch6R5-Ch4 R6-Ch5	
8	Surface and body forces Euler's equation	Definitions Differential equation of a streamline Law of conservation of mass Derivation of continuity equation Surface and body forces Euler's equation and its derivation	L12	T1-Ch7 R5-Ch4 R6-Ch6	
9	Bernoulli's equation for flow along a stream line	Integration of Euler's equation Assumptions made Applications	L13	T1-Ch7 R5-Ch4 R6-Ch6	

10	momentum equation and its application on force on pipe bend	Momentum equation (x, y) Applications Problems on continuity equation, Bernoulli's equation and momentum equation	L14 L15	T1-Ch8 R5-Ch4 R6-Ch6 T1-Ch8 R5-Ch4 R6-Ch6	
UNIT-III					
11	Closed conduit flow:Reynold's experiment	Objective Closed conduit flow, hydraulic diameter Reynold's Experiment	L16	T1-Ch11 R5-Ch9 R5-Ch9	
12	Minor losses in pipes pipes and major losses	Sudden expansion Sudden contraction Pipe bendsDarcey's equation	L17 L18	T1-Ch11 R5-Ch9 R5-Ch9	
13	Total Energy Line	Total Energy Line & Hydraulic Gradient Line (TEL and HGL) Numerical problems on TEL and HGL	L19	T1-Ch11R5-Ch9R5-Ch9	
14	Measurement offlow: Pitot tube, venturimeter and orifice meter, flownozzle, turbine flowmeter	Measurement of flow: Pitot TubeSimple pitot tubePitot static tubeVenturimeter, coefficient of discourageNumerical problemsOrifice Meter, coefficient of dischargeNumerical problemsFlow through orifices, Cv, Cc, CdFlow nozzle, Turbine flow meter	L20 L21 L22 L23	T1-Ch7R5-Ch4,13R6-Ch6 T1-Ch7 R5Ch4,13R6-Ch6	
15	Boundry layer concept: Definitions, Characteristics along thin plate	Introduction ,concept of boundry layer,definitions, laminar, turbulent , transient boundry layer,	L24	T1-Ch12 R2-Ch 8,12	
16	Boundry layer thickness	Displacement thickness , momentum thickness ,energy thickness and problems.	L25 L26	T1-Ch12 R2-Ch8,12	
17	laminar boundary layer, turbulent boundary layer, laminar sub-layer and boundary layer thickness.	Relation of laminar, transient and turbulent boundary layer	L27	T1-Ch12 R2-Ch9,12	
18	Separation of boundary layer	Pressure gradient, velocity distribution	L28	T1-Ch12 R2-Ch9,12	
19	Submerged objects : lift and drag	Flow over solid body, form drag, skin drag ,lift and drag force	L29	T1-Ch12 R2-Ch9,13	
UNIT-IV					

20	Hydrodynamic force of jets on stationary and moving flat and inclined plates	Hydrodynamic force on moving flat and inclined plates, work done and efficiency	L30	T1-Ch20R3-Ch2R5-Ch1	
		Hydrodynamic force on stationary curved vane: jet striking centrally and at tip	L31	T1-Ch20 R3-Ch2 R5-Ch15	
21	Hydrodynamic forceof jets on stationaryand moving curvedvanes: jet strikingcentrally and at tip,work done andefficiency	Hydrodynamic force on moving curved vane: jet striking centrally and at tip, work done and efficiency Numerical problems	L32 L33	T1-Ch20 R3-Ch2 R5-Ch15	
22	velocity diagrams, flow over radial vanes	Velocity triangles notations	L34	T1-Ch20R3-Ch2R5-Ch15	
		, Flow over radial vanes, inlet andoutlet velocity, triangles city triangles notations	L35	T1-Ch20R3-Ch2R5-Ch15	
		Numerical problemsStationery vaneMoving vane	L36	T1-Ch20R3-Ch2R5-Ch15	
23	Classification ofturbines, impulseand reaction turbines	Objective of the unitClassification of turbines: impulseand reaction turbines and other types	L 37	T1-Ch21R5-Ch15R3-Ch5	
24	Pelton wheel,working proportions,work done, efficiencies,hydraulic design	Pelton Wheel-working, work done and efficiency	L 38	T1-Ch21R5-Ch15R3-Ch5	
		Working proportion, design calculationsNumerical problems	L 39	T1-Ch21R5-Ch15R3-Ch5	
25	Francis turbine,working proportions,work done, efficiencies,hydraulic design	Francis turbine-working, work doneand efficiency	L 40	T1-Ch21R5-Ch15R3-Ch6	
		Working proportion, designNumerical problems	L 41	T1-Ch21R5-Ch15R3-Ch6	
26	Kaplan turbine,working proportions	Kaplan turbine-working proportion	L 42	T1-Ch21R5-Ch15R3-Ch7	
27	Draft tube theory	Draft tube theory, expression forefficiency Numerical problems	L 43 L44	T1-Ch21 R5-Ch15R3-Ch7,8	
28	Geometric similarity,Unit and specificquantities	Objective,Geometric similarity, Unit headUnit speed, Unit discharge	L 45	T1-Ch22R5-Ch15R3-Ch10	

		Specific speed Numerical problems	L 46	T1-Ch22R5-Ch15R3-Ch10	
29	characteristic curves	Constant headConstant speedConstant efficiency	L 47	T1-Ch22R5-Ch15R3-Ch10	
30	governing of turbines,selection of types of turbines, cavitation	Governing of pelton wheel Governing of francis turbine	L 48	T1-Ch22R5-Ch15R3-Ch10	
		Cavitation factor Selection of turbines	L 49	T1-Ch22R5-Ch15R3-Ch10	
31	Surge tanks, water hammer	Water hammer principle Surge tank working	L 50	T1-Ch21R3-Ch9	
UNIT-V					
32	Classification,working, workdoneManometric head	Objective,Working of centrifugal pumpTypes of centrifugal pumpWork done by impellerManometric head	L 51	T1-Ch24R5-Ch15R3-Ch11	
33	losses andefficiencies, specificspeed	Losses and efficiencies Specific speed	L 52	T1-Ch24R5-Ch15R3-Ch11	
34	Pumps in series and parallel	Pumps in series and in parallel Numerical problems	L 53	T1-Ch24R5-Ch15R3-Ch11	
35	Performancecharacteristic curves,NPSH	Performance characteristiccurves, NPSH	L 54	T1-Ch24R5-Ch15R3-Ch11	
36	Reciprocatingpumps: Working	Working of reciprocating pumpsMain components, types	L 55	T1-Ch23R5-Ch16R3-Ch1	
37	Discharge, slip	Work done,Coefficient of discharge,Slip,Numerical problems	L 56 L 57	T1-Ch23R5-Ch16R3-Ch1	
38	Indicator diagrams	Indicator diagrams with andwithout air nesses	L 58	T1-Ch23R5-Ch16R3-Ch1	

Signature of faculty **signature of HOD**

Objective Questions

1. Fluid is a substance that

(a) cannot be subjected to shear forces

(b) always expands until it fills any container

(c) has the same shear stress.at a point regardless of its motion

(d) cannot remain at rest under action of any shear force

(e) flows.

Ans: d

2. Fluid is a substance which offers no resistance to change of

(a) pressure

(b) flow

(c) shape

(d) volume

(e) temperature. Ans: c

3. Practical fluids

(a) are viscous

(b) possess surface tension

(c) are compressible

(d) possess all the above properties

(e) possess none of the above properties. Ans: d

4. In a static fluid

(a) resistance to shear stress is small

(b) fluid pressure is zero

(c) linear deformation is small

(d) only normal stresses can exist

(e) viscosity is nil.

Ans: d

5. A fluid is said to be ideal, if it is

(a) incompressible

(b) inviscous

(c) viscous and incompressible

(d) inviscous and compressible

(e) inviscous and incompressible. Ans: e

6. An ideal flow of any fluid must fulfill the following

(a) Newton's law of motion

(b) Newton's law of viscosity

(c) Pascal' law
(f) Continuity equation

(g) Boundary layer theory. Ans: d

(f) If no resistance is encountered by displacement, such a substance is known as

(a) fluid

(b) water

(c) gas

(d) perfect solid

(e) ideal fluid. Ans: e

(g) The volumetric change of the fluid caused by a resistance is known as

(f) volumetric strain

(g) volumetric index

(h) compressibility

(i) adhesion

(j) cohesion.

Ans: c

9. Liquids

(f) cannot be compressed

(g) occupy definite volume

(h) are not affected by change in pressure and temperature

(i) are not viscous

(j) none of the above.

Ans: e

(f) Density of water is maximum at

(a) 0°C

(b) 0°K

(c) 4°C

(d) 100°C

(e) 20°C. Ans: c

(g) The value of mass density in kgsecVm4 for water at 0°C is

(a) l

(b) 1000

(c) 100

(d) 101.9

(e) 91 Ans: d

(h) Property of a fluid by which its own molecules are attracted is called

(a) adhesion

(b) cohesion

(c) viscosity

(d) compressibility

(e) surface tension. Ans: b

(i) Mercury does not wet glass. This is due to property of liquid known as

13. adhesion

14. cohesion

15. surface tension

16. viscosity

17. compressibility.

Ans: c

(f) The property of a fluid which enables it to resist tensile stress is known as

(a) compressibility

(b) surface tension

(c) cohesion

15. adhesion

16. viscosity. Ans: c

(f) Property of a fluid by which molecules of different kinds of fluids are attracted to each other is called

(a) adhesion

(b) cohesion

(c) viscosity

(d) compressibility

(e) surface tension. Ans: a

(g) The specific weight of water is 1000 kg/m"

(f) at normal pressure of 760 mm

(g) at 4°C temperature

(h) at mean sea level

(i) all the above
17. none of the above. Ans: d

17. Specific weight of water in S.I. units is equal to

(f) 1000 N/m3

(g) 10000 N/m3

(h) 9.81 xlO3 N/m3

(i) 9.81 xlO6N/m3

(j) 9.81 N/m3. Ans: c

19. When the flow parameters at any given instant remain same at every point, then flow is said to be

(a) quasi static

(b) steady state

(c) laminar

(d) uniform

(e) static. Ans: d

20. Which of the following is demensionless

(a) specific weight

(b) specific volume

(c) specific speed

(d) specific gravity

(e) specific viscosity. Ans: d

21. The normal stress in a fluid will be constant in all directions at a point only if

(a) it is incompressible

(b) it has uniform viscosity

(c) it has zero viscosity

(d) it is frictionless

(e) it is at rest. Ans: e

22. The pressure at a point in a fluid will not be same in all the directions when the fluid is

a) moving

b) viscous

c) viscous and static

d) inviscous and moving

e) viscous and moving. Ans: e

23. An object having 10 kg mass weighs 9.81kg on a spring balance. The value of 'g' at this place is

(a) 10m/sec2

(b) 9.81 m/sec2

(c) 10.2/m sec

(d) 9.75 m/sec2

(e) 9 m/sec . Ans: a

24. The tendency of a liquid surface to contract is due to the following property

(a) cohesion

(b) adhesion

(c) viscosity

(d) surface tension

(e) elasticity.

Ans: d

24. The surface tension of mercury at normal temperature compared to that of water is

a) more

b) less

c) same

d) more or less depending on size of glass tube

e) none of the above.

Ans: a

25. A perfect gas

(a) has constant viscosity

(b) has zero viscosity

(c) is in compressible

(d) is of theoretical interest

(e) none of the above. Ans: e

26. For very great pressures, viscosity of moss gases and liquids

a) remains same

b) increases

c) decreases

d) shows erratic behavior

e) none of the above.

Ans: d

27. A fluid in equilibrium can't sustain

(a) tensile stress

(b) compressive stress

(c) shear stress

(d) bending stress

(e) all of the above. Ans: c

28. Viscosity of water in comparison to mercury is

a) higher

b) lower

c) same

d) higher/lower depending on temperature

29. unpredictable.

Ans: a

29. The bulk modulus of elasticity with increase in pressure

(a) increases

(b) decreases

(c) remains constant

(d) increases first up to certain limit and then decreases

(e) unpredictable.

Ans: a

30. The bulk modulus of elasticity

(a) has the dimensions of 1/pressure

(b) increases with pressure

(c) is large when fluid is more compressible

(d) is independent of pressure and viscosity

(e) is directly proportional to flow. Ans: b

31. A balloon lifting in air follows the following principle

(a) law of gravitation

(b) Archimedes principle

(c) principle of buoyancy

(d) all of the above

(e) continuity equation. Ans: d

32. The value of the coefficient of compressibility for water at ordinary pressure and temperature in kg/cm is equal to

(a) 1000

(b) 2100

(c) 2700

(d) 10,000

(e) 21,000. Ans: e

33. The increase of temperature results in

a) increase in viscosity of gas

b) increase in viscosity of liquid

c) decrease in viscosity of gas

d) decrease in viscosity of liquid

e) (a) and (d) above.

Ans: d

34. Surface tension has the units of

(a) newtons/m

(b) newtons/m

(c) new tons/m

(d) newtons

(e) newton m. Ans: c

35. Surface tension

a) acts in the plane of the interface normal to any line in the surface

b) is also known as capillarity

c) is a function of the curvature of the interface

d) decreases with fall in temperature

e) has no units.

Ans: a

7. The stress-strain relation of the newtoneon fluid is

(a) linear

(b) parabolic

(c) hyperbolic

(d) inverse type

(f) none of the above. Ans: a

8. A liquid compressed in cylinder has a volume of 0.04 m3 at 50 kg/cm2 and a volume of 0.039 m3 at 150 kg/cm2. The bulk modulus of elasticity of liquid is

(a) 400 kg/cm2

(b) 4000 kg/cm2

(c) 40 x 105 kg/cm2

(d) 40 x 106 kg/cm2

(e) none of the above. Ans: b

36. The units of viscosity are

a) metres2 per sec

b) kg sec/metre

c) newton-sec per metre2

d) newton-sec per meter

e) none of the above. Ans: b

37. Kinematic viscosity is dependent upon

(a) pressure

(b) distance

(c) level

(d) flow

(e) density. Ans: e

38. Units of surface tension are

a) energy/unit area

b) distance

c) both of the above

d) it has no units

e) none of the above. Ans: c

41. Which of the following meters is not associated with viscosity

(a) Red wood

(b) Say bolt

(c) Engler

(d) Orsat

(e) none of the above. Ans: d

42. Choose the correct relationship

(a) specific gravity = gravity x density

(b) dynamicviscosity = kinematicviscosity x density

(c) gravity = specific gravity x density

(d) kinematicviscosity = dynamicviscosity x density

(e) hydrostaticforce = surface tension x gravity. Ans: b

43. Dimensions of surface tension are

(a) MlL°T2

(b) MlL°Tx

(c) MlL r2

(d) MlL2T2

(e) MlL°t. Ans: a

44. For manometer, a better liquid combination is one having

(a) higher surface tension

(b) lower surface tension

(c) surface tension is no criterion

(d) high density and viscosity

(e) low density and viscosity. Ans: a

45. If mercury in a barometer is replaced by water, the height of 3.75 cm of mercury will be following cm of water

(a) 51 cm

(b) 50 cm

(c) 52 cm

(d) 52.2 cm

(e) 51.7 cm. Ans: a

46. Choose the wrong statement.

Alcohol is used in manometer, because

a) its vapour pressure is low

b) it provides suitable meniscus for the inclined tube

c) its density is less

d) it provides longer length for a given pressure difference

e) it provides accurate readings.
Ans: a

47. Increase in pressure at the outer edge of a drum of radius R due to rotation at corad/sec, full of liquid of density p will be

(a) pco2/?2

(b) pco2/?2/2

(c) 2pa2R2

(d) pa2R/2

(e) none of the above. Ans: b

48. The property of fluid by virtue of which it offers resistance to shear is called

47. surface tension

48. adhesion

49. cohesion

50. viscosity

51. all of the above. Ans: d

49. Choose the wrong statement

(a) fluids are capable of flowing

(b) fluids conform to the shape of the containing vessels

(c) when in equilibrium, fluids cannot sustain tangential forces

(d) when in equilibrium, fluids can sustain shear forces

(e) fluids have some degree of comprehensibility and offer little resistance to form. Ans: d

50. The density of water is 1000 kg/m3 at

a) 0°C

b) 0°K

c) 4°C (d) 20°C

d) all temperature. Ans: c

53. If w is the specific weight of liquid and k the depth of any point from the surface, then pressure intensity at that point will

be

(a) h

(b) wh

(c) w/h

(d) h/w

(e) h/wh. Ans: b

54. Choose the wrong statement

(a) Viscosity of a fluid is that property which determines the amount of its resistance to a shearing force

(b) Viscosity is due primarily to interaction between fluid molecules

(c) Viscosity of liquids decreases with in-crease in temperature

(d) Viscosity of liquids is appreciably affected by change in pressure

(e) Viscosity is expressed as poise, stoke, or saybolt seconds.

Ans: d

55. The units of kinematic viscosity are

(a) metres2 per sec

(b) kg sec/metre

(c) newton-sec per metre

(d) newton-sec per metre

(e) none of the above. Ans: a

56. The ratio of absolute viscosity to mass density is known as

(a) specific viscosity

(b) viscosity index

(c) kinematic viscosity

(d) coefficient of viscosity

(e) coefficient of compressibility. Ans: c

57. Kinematic viscosity is equal to

a) dynamic viscosity/density

b) dynamicviscosity x density

c) density/dynamic viscosity

d) 1/dynamicviscosity x density

e) same as dynamic viscosity. Ans: a

58. Which of the following is the unit of kinematic viscosity

(a) pascal

(b) poise

(c) stoke

(d) faraday

(e) none of the above. Ans: c

UNIT WISE QUESTION BANK

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
UNIT-I **SHORT ANSWER QUESTIONS**			
1	Define is Pascal's law?	Knowledge	**a**
2	When does capillary fall take place? Explain.	Knowledge	**a**
3	Explain the importance of vapour pressure in fluid mechanics	Comprehension	**a**
4	How are manometers are classified	Application	**a**
5	What is the difference between gauge pressure and absolute pressure? Explainhow negative gauge pressure can be measured.	Comprehension	**a**
6	What are the pressure measuring devices? Explain the working of an inverted U tube differential manometer.	Knowledge	**a**
7	Differentiate i) Real fluids & Ideal fluids	Knowledge	**a**
8	Differentiate ii) Newtonian & non Newtonian fluids.	Analysis	**a**
9	Explain how the meta-centric height of a floating body can be determinedexperimentally?	Comprehension	**a**
10	Define capillarity and surface tension and discuss the factors affecting them	Knowledge	**a**

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
UNIT-I **LONG ANSWER QUESTIONS**			
1	A plate having an area of 0.6 m2 is sliding down the inclined plane at 300tothe horizontal with a velocity of 0.36 m/s. There is a cushion of fluid 1.8 mmthick between the plane and the plate. Calculate the viscosity of the fluid if theweight of the plate is 280 N	Application	**a**
2	A sleeve 10cm long encases a vertical metal rod 3.0cm in diameter with a radial clearance of 0.02mm. When immersed in an oil of viscosity 6.0poise, the effective weight of the sleeve is 7.5N. Will the sleeve slide down the rod and if so at what velocity?	Knowledge	**a**
3	Determine the diameter of the throat of a venturimeter to be	Evaluation	**c**

	introduced in a horizontal section of a 0.10m diameter main so that reading of the differential U-tube manometer is		
4	What is the difference between U – tube differential monometer and inverted U – tube differential manometer? For the arrangement shown in figure, determine the height 'H'	Comprehension	**a**
5	A "U"-tube manometer is being used to measure the pressure difference between two points on a horizontal pipe. The fluid in the pipe has a relative density of 0.8 and the manometric fluid has a density 13600 kg/m^3. The two readings on the manometer differ by 0.5m. What is the	Comprehension	**a**
6	Explain in detail the phenomena of Viscosity and surface tension	Comprehension	**a**
7	A Pressure vessel has an internal volume of 0.5 m^3 at atmospheric pressure. It is desired to test the vessel at 300 bar by pumping water into it. The estimated variation in the change of the empty volume of the container due to pressurization to 300 bar is 6 percent. Calculate the mass of water to be pumped into the vessel to attain the desired pressure level. Given the bulk modulus of elasticity of	Application	**C**
8	A 150 mm diameter vertical cylinder rotates concentrically inside a fixed cylinder of diameter 155 mm. Both the cylinders are 450mm long. Calculate the dynamic viscosity of the liquid that fills the space between the cylinders if a torque of 1.05 N-m is required to maintain a speed of inner	Application	**A**
9	Distinguish amongst solids, liquids and gases.	Comprehension	**A**
10	Explain principle of the Pitot static tube	Comprehension	**A**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	
	UNIT-II **Short Answer Questions**		
1	State the assumptions and derive Bernoulli's equation for flow along a stream line.	Knowledge	**b**
2	Distinguish between Laminar and turbulent flow	Comprehension	**b**
3	Distinguish between Rotational and Irrotational flow.	Comprehension	**b**
4	Explain how the meta-centric height of a floating body can be determined experimentally?	Comprehension	**a**
5	Define and state the applications of momentum equation	Knowledge	**b**
6	Distinguish between Uniform and non-uniform flow	Comprehension	**b**

7	Define path line, stream line steam tube and streak line.	Knowledge	**b**
8	Define and state examples of following flows i) Steady and unsteady ii) Laminar and turbulent	Knowledge	**b**
9	Distinguish between uniform and non-uniform flow	Comprehension	**b**
10	Distinguish between Steady flow and unsteady flow	Comprehension	**b**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outco**
	UNI T-II Tuto		
1	State the assumptions and derive Bernoulli's equation for flow along a stream line.	Knowledge	**b**
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3	Distinguish between Rotational and Irrotational flow.	Comprehension	**b**
4	Explain how the meta-centric height of a floating body can be determined experimentally?	Comprehension	**a**
5	Define and state the applications of momentum equation	Knowledge	**b**
6	Distinguish between Uniform and non-uniform flow	Comprehension	**b**
7	Define path line, stream line steam tube and streak line.	Knowledge	**b**
8	Define and state examples of following flows i) Steady and unsteady ii) Laminar and turbulent	Knowledge	**b**
9	Distinguish between uniform and non-uniform flow	Comprehension	**b**
10	Distinguish between Steady flow and unsteady flow	Comprehension	**b**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
	UNIT-II Tutorials Long Answer Questions		
1	Derive the Bernoulli's equation along streamline and state the assumptions and limitations while deriving it	Synthesis	**b**
2	Distinguish between stream lines, streak lines & path lines the flow field is given by $\psi = x^3y$ check whether the given field exist or not? Further check whether it is irrotational	Comprehension	**b**
3	Explain how the fluid flows are classified? Explain the sketches where necessary.	Comprehension	**b**

4	Define continuity equation & derive the expression for the same for on dimension flow. The velocity components for two dimensional, steady static and incompressible flow field are given by U = C*xy*and V = C $\log_e$(xy). Check whether the flow exist or not?	Knowledge	**b**
5	Derive the one-dimensional continuity equation along a	Synthesis	**b**

	streamline and state the assumptions clearly in deriving it		
6	A pipe containing water at 172KN/m2 pressure is connected by a differential gauge to another pipe 1.5m lower than first pipe and containing water at high pressure. If the difference in the heights of the two mercury columns of the gauge is equal to 75mm, what is the pressure in the lower pipe? Specific gravity of mercury is 13.6.	Comprehension	**c**
7	An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is owing. The vertical distance between the axes of these pipes is 20cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 20cm. Sketch the	Evaluation	**c**
8	Develop the equation of stream line passing through (2,2) for the fluid flow V= $-y^2i$ - 6xj.	Analysing	**b**
9	In a two-dimensional incompressible flow, the fluid velocity components are given by u = x- 4y and v = -y-4x. Show that the velocity potential exists and determine its form. Find also the stream function.	Evaluation	**b**
10	Explain principle of the Pitot static tube	Knowledge	**a**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
	UNIT-III **Short Answer Questions**		
1	What are the discharge measuring devices in a pipe line? Discuss them with neat sketches.	Comprehension	**c**
2	Derive the Darcy-weisbach equation	Synthesis	**c**
3	Differentiate tangential flow and radial flow.	Analysis	**b**
4	Explain the laminar and turbulent boundary layers	Comprehension	**d**
5	Define displacement thickness. Derive an expression for the displacement thickness.	Knowledge	**d**
6	Illustrate that the momentum thickness for boundary layer flows are given by	Analysis	**d**
7	Explain the methods of controlling the boundary layer.	Comprehension	**d**

8	Define total energy line and hydraulic grade line	Knowledge	**c**
9	Explain the concept of boundary layer seperation.	Comprehension	**d**
10	Differentiate between Laminar boundary layer and turbulent boundary layers.	Analysis	**d**

Sl.No.	Questions	Blooms Taxonomy Level	Course Outcome
	UNIT-III **Long Answer Questions**		
1	For the velocity profile for laminar boundary layer Determine the boundary layer thickness, shear stress, drag force and co-efficient drag in terms of Reynolds number.	Evaluation	**d**
2	Water flows through a 0.9m diameter pipe at the end of which there is reduction connecting to a 0.6m diameter pipe. If the gage pressure at the entrance reduces to 412.02 kN/m^2 and the velocity is 2m/s, determine the resultant thrust, assuming that the frictional; loss of head in the reduces is 1.5m	Evaluation	**c**
3	A pilot tube records a reading of 7.85 kN/m^2 as the stagnation pressure when it is held at the centre of a pipe of 250 mm diameter conveying water. The state pressure is the discharge 40 mm of mercury (gauge – vacuum). Calculate the discharge	Application	**c**
4	Describe Reynold's experiment and state the significance of Reynold's number. Pipes of 500 mm diameter, 1800m length, 400 mm diameter, 1200 m length and 300 mm diameter, 600 m length are connected in series. If these pipes are to be replaced by an equivalent pipe of 400 mm diameter, what would be its length	Knowledge	**c**
5	Water flows horizontally through a constant area pipe with cross-sectional area of 0.001m^2 and with 180^0 bend. The flow is axial and its velocity is 5m/s throughout. The absolute pressures at the entrance and exit of the bend are 2.2 bar and 1.6 bar respectively. Calculate the anchoring force required to hold the bend in place. Assume the atmospheric pressure as 1 bar	Application	**b**
6	A pipeline, 40cm diameter, conveying oil (specific gravity =0.85) at the flow rateof 1500lit/sec has a 900 bend in the horizontal plane. The pressure at the entranceto the bend is 1340bar and the loss of head in the bend is 2.5m of oil. Find the magnitude and direction of the force exerted by the oil on the bend and show thedirection of the force on a sketch of the bend	Application	**b**
7	Three pipes 300m long, 300mm diameter; 150m long, 200mm diameter and 200m long, 250mm diameter are connected in series in the same order. Pipe having 300mm diameter is connected to reservoir. Water level in the reservoir is 15m	Evaluation	**c**

	above the pipe axis which is horizontal. The respective friction factors for the three pipes are 0.018, 0.02 and 0.019. Determine flow rate		
8	Derive an expression for loss of head due to sudden expansion in pipe line with usual notation	Synthesis	**c**
9	What do you understand by displacement thickness and momentum thickness?	Comprehension	**d**
10	Discuss the phenomenon of separation of diverging flow	Comprehension	**d**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
UNIT-IV Tutorials Short Answer Questions			
1	Derive the equation for force exerted by a jet striking a stationary hemispherical vane at the centre.	Synthesis	**e**
2	A jet of water 50 mm in diameter issues with a velocity of 10m/sec and impinges normally on a stationary at plate which move in forward motion. Find the force exerted by the jet on the plate and the work done.	Application	**e**
3	Write a short notes on of types draft tubes and its importance in the reaction turbines	Knowledge	**e**
4	Obtain the expression for the specific speed of a turbine.	Synthesis	**e**
5	Write short notes on the following: a) Governing of turbine b) Characteristic curves of centrifugal pumps c) Types of hydro electric stations	Knowledge	**e**
6	Derive an expression for the force exerted by a jet of water on a fixed curved unsymmetrical vane in the direction of the jet.	Synthesis	**e**
7	Define the following; Unit speed Degree of reaction	Knowledge	**e**
8	Define the following efficiencies; (i)Mechanical (ii) volumetric	Knowledge	**e**
9	Give the classification of turbines.	Comprehension	**e**
10	Differentiate the impulse and reaction turbines.	Analysis	**e**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
UNIT- IV Tutorial			

1	A radial flow hydraulic turbine is required to be designed to produce 20 MW under a head of 16m at a speed of 90 rpm. A geometrically similar model with an output of 30 kW and a head of 4m is to be tested under dynamically similar conditions. At what speed must the model be run? Calculate the required impeller diameter ratio between the model and prototype and what is the volume flow rate through the model if its efficiency can be assumed to be 90%.	Application	**e**
2	Obtain the relation between the velocity of jet and the velocity of the vane to obtain the maximum efficiency, when a jet of water impinges on a series of vanes mounted on the circumference of a wheel at a fixed distance apart	Synthesis	**e**
3	A 20 cm diameter jet of oil of specific gravity 0.85 strikes a stationary at plate at an angle of 35 degrees to the normal. Estimate the force exerted on the plate when the velocity of the jet is 25m/sec	Comprehension	**e**
4	A Pelton wheel having a mean bucket diameter of 1.0 m is running at 1000 r.p.m. the side clearance angle is 150 and discharge through the nozzle is 0.1m3/s, determine power available at the nozzle and hydraulic efficiency of the turbine	Evaluation	**e**
5	Draw a schematic diagram of a Francis turbine and explain briefly its construction and working	Knowledge	**e**
6	A smooth flat plate 1 m wide and 1.5m long is rowed lengthwise through still air with a velocity of 10m/s. Assuming the boundary layer to be fully laminar, estimate its thickness at the trailing edge. Mass density and kinematic viscosity of the air are 1.216kg/m^3. And 0.15X10^{-4} m^2/sec respectively. Also calculate the shear stress at that point	Application	**e**
7	Illustrate that the force exerted by a jet of water on a moving hemispherical curved vane when the jet strikes at the centre is F = 2 _a(V-u)2 where row = Mass density of water a = Area of cross section of the jetV = Velocity of the jet. u = Velocity of the vane in the direction of the jet	Analysis	**e**
8	A jet of water having a velocity of 20 m/s strikes a curved vane which is moving with a velocity 9m/s. The vane at inlet and lever at an angle 130^0 to the direction of motion of the vane and outlet, calculate the work done per second per kg of water. Strikes the vane	Application	**e**
9	Illustrate for a pelton wheel turbine, the hydraulic efficiency is maximum when the bucket speed is equal to half the velocity of jet and obtain the expression for the maximum hydraulic efficiency with usual notation	Analysis	**e**
10	Water is supplied to a turbine through a 0.3 m diameter pipe at the rate of 0.3m^3/s. After passing through the turbine water is discharged through a draft tube which has a diameter of 0.6m at point B which is 1m below a point A in the 0.3m pipe. If the pressure at the points A and B are respectively 147.15 kN/m^2 and -34.335 kN/m^2. Determine the power delivered to the turbine by the water	Evaluation	**e**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**

UNIT-V Tutorials Short Answer Questions			
1	What do you mean by characteristic curves of a turbine? Discuss about different operating characteristics of a turbine with neat figures	Knowledge	**e**
2	Explain the terms unit speed, unit discharge and unit power of a turbine and explain their importance	Comprehension	**e**
3	Write short notes on i. Cavitation ii. Governing of turbines	Knowledge	**e**
4	What are unit quantities? Define the unit quantities for a turbine. Why are they important?	Comprehension	**e**
5	Write short notes on the following: a) Surge tanks b) NPSH c) Types of hydro electric stations	Knowledge	**f**
6	Define the terms `unit power', `unit speed' and `unit discharge' with referenceto a hydraulic turbine. Also derive expressions for these terms.	Knowledge	**e**
7	Explain the phenomenon of fluid slip in the centrifugal pump	Comprehension	**f**
8	Write about the performance characteristic curves of a centrifugal pump	Knowledge	**f**
9	How will you obtain an expression for the minimum speed for starting a centrifugal pump?	Analysis	**f**
10	What do you mean by specific speed of a centrifugal pump? Derive the expression for the same.	Knowledge	**f**

Sl.No.	**Questions**	**Blooms Taxonomy Level**	**Course Outcome**
UNIT-V Tutorials Long Answer Questions			
1	A hydraulic turbine develops 7355 kW of power under a head of 24.7m at 210 rpm. What is its specific speed? Indicate the type of turbine suitable for the purpose if this turbine is tested in the laboratory where the head available is 7.5 m, what power will if develop and at what speed	Application	**e**
2	Sketch and describe a modern method of regulation to maintain a constantspeed for either i. Pelton wheel or ii. Francis turbine.	Knowledge	**e**
3	Define Manometric efficiency, volumetric efficiency, mechanical efficiency, overall efficiency as applied to centrifugal pump	Knowledge	**f**

4	The inner and outer diameters of an impeller of a centrifugal pump are 250 mm and 500 mm respectively. The velocity of flow at outer is 1.5 m/s and vane outlet angle 60^0. If the manometric efficiency is 75%, final out the minimum speed required to start the flow	Application	**f**
5	Define NPSH and derive the equation for the same. Why pump industry specifies NPSH for pumps. What is its significance	Knowledge	**f**
6	What is a Surge tank and a fore bay and what are their functions? Describe with neat sketches different types of surge tank?	Knowledge	**e**
7	Define the terms `unit power', `unit speed' and `unit discharge' with referenceto a hydraulic turbine. Also derive expressions for these terms	Knowledge	**e**
8	Write short notes on the following: a) Surge tanks b) Characteristic curves of centrifugal pumps c) Types of hydroelectric station	Analysis	**f**
9	Explain the phenomenon of fluid slip in the centrifugal pump	Comprehensio	**f**
10	How will you obtain an expression for the minimum speed for starting a centrifugal pump	Analysis	**f**

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objective: To learn the basic Business types, impact of the Economy on Businessand Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome: The students will understand the various Forms of Business and theimpact of economic variables on the Business. The Demand, Supply, P oduction, Cost, Market Structure, Pricing aspects are learnt. The Students can study the fi m's financial position by analysing the Financial Statements of a Company.

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, LimitedLiability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.**Economics:** Significance of Economics, Micro and Macro Economic Concepts, Conceptsand Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, types of Elasticity, Law of Demand, Measurement andSignificance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. **Supply Analysis:** Determinants of Supply, Supply Function & Law of Supply.

UNIT- III

Production, Cost, Market Structures & Pricing.

Production Analysis: Factors of Production, Production Function, Production Function withone variab e input, two variable inputs, Returns to Scale, Different Types of Production Functions.**Cost analysis**: Types of Costs, Short run and Long run Cost Functions.**Market Structures**: Nature of Competition, Features of Perfect competition, Monopoly,Oligopoly, and Monopolistic Competition.**Pricing:** Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and CostvolumeProfit Analysis.

UNIT-IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation,Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT -V

Financial Analysis through Ratios:

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, P ofitabiity Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - The ry and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. GeethikaGhosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

UNIT WISE PLANNER

UNIT	DETAILS	HOURS
I	**Introduction Business and economics :** Structure of Business Firm, Theory of Firm, Types of Business Entities, LimitedLiability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance. **Economics:** Significance of Economics, Micro and Macro Economic Concepts, Conceptsand Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.	12
II	**Demand and supply analysis**-Elasticity, types of Elasticity, Law of Demand, Measurement andSignificance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. **Supply Analysis:** Determinants of Supply,Supply Function & Law of Supply.	12
III	**Production, Cost, Market Structures &Pricing.Production Analysis**: Factors of Production, Production Function, Production Function with one variab e input, two variable inputs, Returns to Scale, Different Types of Production Functions.Cost anaysis : Types of Costs, Short run and Long run Cost Functions. **Market Structures**: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. **Pricing**: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis	12
IV	**Financial Accounting:** Accounting concepts and Conventions, Accounting Equation,Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.	14
V	**Financial Analysis through Ratios:** Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, P ofitabiity Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).	15
	TOTAL HOURS	65

Session planner

Subject Name**: BUSINESS ECONOMICS& FINANCIAL ANALYSIS**

S.NO	UNIT NO	NAME OF TOPICS	PERIODS REQUIRED	Teaching Aid	Total No. of classes
1	I	Structure of Business Firm, Theory of Firm, Types of Business Entities,	1	Chalk &Talk	12
2		LimitedLiability Companies, Sources of Capital for a Company	1	OHP	
3		Non-Conventional Sources of Finance. **Economics:** Significance of Economics	2	Chalk &Talk	
4		Micro and Macro Economic Concepts, Conceptsand Importance of National Income,	2	PPT	
5		Inflation, Money Supply in Inflation,	2	Chalk &Talk	
6		Business Cycle, Features and Phases of Business Cycle.	2	Seminars	
7		Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economic methods,	2	Chalk &Talk	
8	II	Elasticity, types of Elasticity, Law of Demand	2	Seminars	12
9		Measurement andSignificance of Elasticity of demand,.	1	Seminars	
10		Factors affecting Elasticity of Demand, Elasticity of Demand	1	Chalk &Talk	
11		Demand Forecasting: Characteristics of Good Demand Forecasting.	2	Chalk &Talk	
12		Steps in Demand Forecasting. Methods of Demand Forecasting	4	Chalk &TaLk	
13		Determinants of Supply,SupplyFunction & Lawof Supply	2	Chalk &Talk	
14	III	Factors of Production, Production Function, Production Function with one variab e input, two variable inputs.	3	Chalk &Talk	12
15		Returns to Scale, Different Types of Production Functions.	2	Seminars	
16		Cost analysis : Types of Costs, Short run and Long run Cost Functions, Nature of Competition, Features of Perfect competition,	3	Chalk &Talk	
17		Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis	4	Chalk &Talk	
19	IV	Accounting concepts and conventions-Introduction IFRS- Double-Entry Book Keeping	2	PPT	14
20		Journal, Ledger, Trial Balance	2	Chalk &Talk	
21		Final Accounts (Trading Account	2	Chalk &Talk	
22		Profit and Loss Account	2	Chalk &Talk	
23		Balance sheets with adjustments	3	PPT	
24		simple problems	3	Chalk &Talk	

25	V	Introduction of financial analysis.and its applications.	3	PPT	15
26		Concept of various ratio	1	SEMINARS	
27		Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios,	3	Chalk &Talk	
28		Proprietary Ratios, Solvency, Leverage Ratios (simple problems).	2	Chalk &Talk	
		Introduction to Fund Flow and Cash Flow Analysis (simple problems).	2	Chalk &Talk	
		Financial Analysis and Interpretation of all Ratios	2	Chalk &Talk	
		Du Pont Chart	2	SEMINARS	

Unit Wise Questions Bank

Unit -1

1. What is theory of firm? Explain the business structure .
2. Explain the various types of business entities.
3. Describe limited liability company.what are the various source of capital for the company.
4. What is non-conventional source of finance.
5. Explain the significance of Economics and its types .
6. Explain the concept and importance of national income
7. Describe in details about inflation and money supply in inflation .
8. Explain the features and phases of business cycle .
9. Describe the nature and scope of business economics .
10. What is the role business economist for the development of the nation.

Unit-2

1. What d you mean the term elasticity of Demand ?explain its types ?
2. Explain the law of Demand and its significance ?
3. What are the various factors thateffectthe elasticity of Demand ?
4. How elasticity of Demand helps in decision making?
5. Describe the concept of demnandforcasting ?
6. What are the characteristics of demand forcasting? Explain various stepes involves in Demand forcasting.
7. Explain the various methods of demand forcastings?
8. What do you mean by the term supply?what are its determinants.
9. Explain the supply function and law of supply**.**
10. What is cost? Explain various cost concept and analysis.

Unit-3

1.Why does the law of diminishing returns operate? Explain with the help of a diagram.

2. Explain the nature and uses of production function.

3. Explain and illustrate lows of returns to scale.

4. a. Explain how production function can be mode use of to reduce cost ofProduction.

b. Explain low of constant returns? Illustrate.

5. Explain the following (i) Internal Economics (ii) External Economics (or)

Explain Economics of scale. Explain the factor, which causes increasing returns to scale.

6. Explain the following with reference to production functions

(a) MRTS(b) Variable proportion of factor

7. Define production function, explain is equate and is cost curves.

8. Explain the importance and uses of production function in break-even analysis.

9. Discuss the equilibrium of a firm with isoquants.

10. How do you determine BEP in terms of physical units and sales value?

Explain the concepts of margin ofsafety & angle of incidence.

Unit -4

1.What do you understand by Double Entry Book Keeping? What are its advantages?

2.Generalise the following transactions and post them to ledger.

i. Ram invests Rs.10,000 in cash.

ii. He bought goods worth Rs. 2,000 from Shyam.
iii. He bought a machine for Rs. 5,000 from Lakshman on account
iv. He paid to LakshmanRs. 2,000
v. He sold goods for cash Rs.3,000
vi. He sold goods to A on account Rs. 4,000
vii.He paid to Shyam Rs.1,000
viii.He received amount from A Rs.2000

3.What is Trial Balance? Why it is prepared?

4.From the following list of balances.prepare a Trial Balance as on 30-6-2017

Opening stock	1,800	Plant	750
Wages	1,000	Machine Tools	180
sales	12,000	Lighting	230
bank loan	440	Creditors	800
Opening stock	1,800	Plant	750
Wages	1,000	Machine Tools	180
sales	12,000	Lighting	230
bank loan	440	Creditors	800

5. From the following Ledger Account balances prepare a Trial Balance as on 31-12-2016.

i.	Opening Stock	15,600	xvi.	Insurance	400
ii.	Freehold premises	30,000	xvii.	Bad reserve	300
iii	Plant & Machinery	9,000	xviii.	Commission Received	3,000
iv.	Wages	2,000	xix.	Commission paid	1,000
v.	Sundry debtors	12,000	xx	Bad debts	300

vi	Carriages inwards	180	xxi	Office expenses	1,500
vii	Carriage outwards	200	xxi	Salaries	2,000
viii	Factory expenses	1,600	xxiii.	Traveling expenses	200
ix.	Royalty	200	xxiv.	Legal expenses	200
x.	Purchase of Machinery	15,000	xxv	Cash at bank	840
xi.	Office Rent	1,400	xxvi.	Cash in hand	800
xii.	Capital	16,000	xxvii	Loan taken	6,000
xiii.	Discount Allowed	800	xxviii	Office rent	800
xiv.	Discount received	720	xxix	Net sales	66,000
xv.	Sundry creditors	4,000			

6. Define the concepts 'Accounting', Financial Accounting and Accounting System'.

7.Explain the main objectives of Accounting and its important functions.

8.In the books of Kishore, prepare Trading and profit and loss account for the year ended 30th June, 2003:

Stock (1.7.2002)	1,06,000
Purchases	3,00,000
Wages	2,50,000
Office salaries	60,000
Discount on sales	20,000
Carriage inwards	20,000
Carriage outwards	60,000
Stationery	3,000
Rent (¾ to Factory)	48,000
Postage	3,500
Transport and conveyance	25,000

General charges	3,500
Commission	26,000
Power	55,000
Rebate on purchases	10,000
Sales	10,00,000

9.Following figures have been extracted from the records of Fancy Stores a proprietary concern as on 31-12-2017:

Furniture	15,000	Insurance	6,000
Proprietors capital a/c	54,000	Rent	22,000
Cash in hand	3,000	Sundry debtors	60,000
Opening stock	50,000	Sales	6,00,000
Fixed deposit	1,34,600	Advertisement	10,000
Drawings	5,000	Postages and Telephone	3,400
Provision for bad debts	3,000	Bad debts	2,000
Cash at bank	10,000	Printing and stationery	9,000
Purchases	3,00,000	General charges	13,000
Salaries	19,000	Sundry creditors	40,000
Carriage inwards	41,000	Deposit from Customers	6,000

Prepare Trading, Profit and loss account and balance sheet after taking into consideration the following information

10.explain the various rules for maintaining Books of Accounts.

Unit -5

1.Write short notes on the following and give appropriate examples
a) Current ratios and Quick ratios
b) Debtor- Turnover ratio and Inventory turnover ratio
2.State the different types of liquidity ratios and turnover ratios and explain their significance.
3.Determine Average Collection period -Total sales:Rs.l,00,000 out of which credit sales were Rs.80,000
Debts receivable at the end of the year:Rs.15,000-Bills receivable:Rs.5,000. Assume the no. of working days as 360.
4.The following are the extracts from the financial statements of Blue and Red Ltd., as on 31st March 2001 and 2002 respectively-
Stock 10,000 25,000Debtors 20,000 20,000Bills receivables 10,000 5,000
Cash in hand 18,000 15,000Bills payable 15,000 20,000
Bank overdraft --- 2,0009% debentures 5,00,000 5,00,000
Sales for the year 3,50,000 3,00,000Gross profit 70,000 50,000
Compute for both the years the following:a) Current ratio b) Liquidity ratio c) Stock turnover ratio. Also interpret the results.
5.Calculate (a) Net Sales to Fixed Assets (b) Net Sales to Inventory (c) Net Profit Ratios given the following and explain their significance in decision making-
Net Sales 10,00,000, Fixed Assets 8,00,000, Inventory 2,20,000 Net profit after taxes 69,840.
6. What are the important ratios that are used in analysis and interpretation of financial statements?
7.Explain and illustrate the types and significance of a)Profitability ratios b) Operating Ratio.

8.Calculate (a) Net Sales to Fixed Assets (b) Net Sales to Inventory (c) Net Profit Ratios given the following and explain their significance in decision making.
Rs. Net Sales 10,00,000Fixed Assets 8,00,000 Inventory 2,20,000 Net profit after taxes 69,840

9.Explain how ratios are used in the interpretation of financial statements and in financial analysis.
10.State the different types of liquidity ratios and turnover ratios and explain their significance.

ASSIGNMENT TOPICS

Assignment topics (1st)

1.Discuss the nature & Scope of Business Economics.
2.Explain the various types of business entities
3.Describe in details about inflation and money supply in inflation .
4.Explain the features and phases of business cycle .
5.What d you mean the term elasticity of Demand?Explain its types .
6.What are the characteristics of demand forcasting?eExplain various stepes involves in Demand forcasting.
7.Explain the various methods of Demand forcastings?

Assignment topic (2nd)

1. Explain how production function can be mode use of to reduce cost of Production
2. Define production function, explain is equate and is cost curves.
3. Explain the following (i) Internal Economics (ii) External Economics (or)
Explain Economics of scale. Explain the factor, which causes increasing returns to scale.
4. Describe the BEP with the help of a diagram and its uses in business decision making.
5.Generalise the following transactions and post them to ledger.
i. Ram invests Rs.10,000 in cash.
ii. He bought goods worth Rs. 2,000 from Shyam.
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vi. He sold goods to A on account Rs. 4,000
vii.He paid to Shyam Rs.1,000
viii.He received amount from A Rs.2000,
6.Write short notes on the following and give appropriate examples
a) Current ratios and Quick ratios
b) Debtor- Turnover ratio and Inventory turnover ratio
7.State the different types of liquidity ratios and turnover ratios and explain their significance.

Important questions

1.Explain the various types of business entities.
2.Describe limited liability company.What are the various source of capital for the company.
3.Describe in details about inflation and money supply in inflation.
4.Explain the features and phases of business cycle.
5.Describe the nature and scope of business economics .
6.What d you mean the term elasticity of Demand ?expalin its types
7.What are the characteristics of demand forcasting?explain various stepes involves in Demand forcasting.
8.Explain the various methods of demand forcastings?
9.Explain the supply function and law of supply**.**
10.Explainthe nature and uses of production function.
11. **Explain how production function can be mode use of to reduce cost ofProduction.**
12.Define production function, explain is equate and is cost curves.
13.. Explain the importance and uses of production function in break-even analysis.
14.Describe the BEP with the help of a diagram and its uses in business decision making.
15.Explain the relationship between MC, AC and TC assuming a short run non-linear cost function.
16.Explain how ratios are used in the interpretation of financial statements and in financial analysis.
17.State the different types of liquidity ratios and turnover ratios and explain their significance.
18.Write short notes on the following and give appropriate examples a) Current ratios and Quick ratiosb) Debtor- Turnover ratio and Inventory turnover ratio.
19. practice of some numerical problems from 4^{th}
20. practices of some numerical problems from 5^{th} unit.

Unit -1 Introduction to Business and Economics

1.Business Economics is close to
(a) Micro economics (b) Macro economics (c)Theory of income and employment (d) Theory of wages and employment

2. Integration of economics theory with business practices is called
(a) **Managerial Economics** (b) Economics
(c)Macro economics(d) Micro economics

3. Who said that economics is the study of nature and use of national wealth
(a) Paul A. Samuelson (b) Prof.Lionel Robbins
(c) Adam Smith (d) Alfread Marshal

4. Any activity, aimed at earning money is called
(a) Economics (b) Science
(c) Management (d) staffing

5. Economics forecasting and foreword planning minimizes ----------about the future.
(a) Plan **(b) Risk**
(c) Certainty (d) Strategy

6. ----------deals with the consumer behavior.
(a) Income (b Life style
(c) consumption(d) Attitude

7. In case of Giffen's goods the demand curve
(a)Slopes downward (b)**Slopes upwards**
(c) Intersects supply curve (d) Meets cost curve

8. Total utility is maximum when
(a)Marginal utility is maximum (b) marginal utility is minimum (c) **marginal utility is zero** (d) marginal utility is less then avg.utility

9. The consumer according to economics analysts is expected to behave
(**a) Rationally** (b) Emotionally
(c) Carefully (d) Indifferently

10. Which of the following has maximum consumer surplus?
(a) Necessities (b) luxury goods
(c) Comforts (d)Conventional necessities

11. What is the position of budget line with respect to indifference curve?
(b) Below (b) above
(c) Tangential (d) intersecting

12. In short runs firms can adjust their production by changing their
(a) Fixed factors **(b) variable factors**

(c) Semi fixed factors (d) both A & B

13. Inflations means -
(a) **Rises in the price of product**(b) fall in price
(c) constant price (d) increase in the demand

14. The no of maximum number of member in public limited company is
(a) 100 (b)1000
(c)10000 **(d) no limit**

15. Business cycle is also known as-
(a) Management cycle (b) **trade cycle**
(c)company cycle (d)all of these

16.Which of the following is the phase of business cycle -
(a) **prosperity phase** (b) maturity phase
(c) stagflation phase (d) all of these

17. Micro economics is the study of
(a) entire nation (b) entire world
(**c)an individual** (d)all of these

18. Macro Economics is the study of
(a) entire nation (b) an individual
(c) any group (d) any company

19. Which subject bridges gap between Economic Theory and Management Practice?
(a) Welfare Economics (b) Micro Economics
(c**) Business Economics** (d) Macro Economics

20. The theory of firm also called as_____.
(a) Welfare Economics b) Industrial Economics
(c) **Micro Economics** (d) None

Note-Ans are in bold

Unit -2 Demand and supply analysis

2.An extension is the ---------- movement along a demand curve.
(a) Parallel (b) upward
(c) Overlap **(d) downward**

3. Indiffrence curve are ----------to the origin.
(a)convex (b) concave
(c) Simple (d) crossed

4. Which of the following pair of goods is an example of substitutes?
(a) Tea and sugar **(b) Tea and Coffee**
(c) Shirt and pent (d) Car and Petrol

5. If the price rises the demand
(a)rises **(b)falls**
(c) Constant (d) first falls then rises
6. Price elasticity is always

(a)positive **(b) Negative**
(c) Consistent d) Declining

7. If the income elasticity is positive and greater the one, it is a
(a)Necessities (b) Inferior goods
(c) Normal goods **(d) Superior good**

8. which of the following is quantity demanded in response to given changes in prices
(a) Price elasticity (b) Cross elasticity
(c) Income elasticity (d) Advertising elasticity

9. Which of the following does not hold good in case of indifference curve?
(a)sloping downwards (b)sloping upwards
(c) Convex to the origin (d) **constant slope**

10. When PE = 0 (Price Elasticity of Demand is Zero), we call it ___.
(a) Relatively Elastic demand (b) Perfectly Elastic demand
(c) **Perfectly Inelastic demand**(d) Unit Elastic demand

11. When PE =>1 (Price Elasticity of Demand is greater than one), We call it ___.
(a) Perfectly Elastic demand (b) Perfectly inelastic demand
(c**) Relatively Elastic demand**(d) relatively inelastic demand

12. When PE =<1 (Price Elasticity of Demand is less than one), We call it __,
(a) Perfectly inelastic demand (b) Relatively Elastic demand
(c) **Relatively inelastic demand** (d) perfectly Elastic demand

13. When PE =1 (Price Elasticity of Demand is one), we call it ___.
(a) Perfectly Elastic demand (b) Perfectly inelastic demand
(c) Unit elastic demand (d) Relatively Elastic demand

14. When Income Elasticity of demand is Zero (IE = 0), It is termed as
(a) Negative Income Elasticity (b) Unit Income Elasticity
(c) **Zero Income Elasticity** (d) Infinite Income Elasticity
15.Income Elasticity of demand when less than 'O' (IE = □ O), it is termed as _____.
(a) Income Elasticity less than unity (b) Zero income Elasticity
(c) **Negative Income Elasticity** (d) Unit Income Elasticity

16. The other name of inferior goods is
(a) Veblan goods (b) Necessaries
(c) Geffen goods (d) Diamonds

17. Estimation of future possible demand is called
(a) Sales Forecasting (b) Production Forecasting
(c) **Income Forecasting** (d) Demand Forecasting

18. How many methods are employed to forecast the demand
(a) Three (b) Four
(c) Two (d) Five

19.Who explained the "Law of Demand"?
(a) Joel Dean (b) Cobb-Douglas
(**c) Marshall** (d)
C.I.Savage&T.R.Small

20. Demand Curve always _____ sloping.

(a) Positive (b) Straight line

(**c) Negative** (d) Vertical

Ans are bolded

Unit -3 Production, Cost , Market structure and Pricing

1.Exchange value of a unit of good expressed in terms of money

(a) Cost (b) Capital

(c) Price (d) Expenditure

2.The price of a product is determined by the _____of that product

(a) Place and time (b) Production and sales

(c) Demand and supply (d) Cost and income

3. The price at which demand and supply of a commodity equal is called as

(a) High price (b) Low price

(c) Equilibrium price (d) Marginal price

4. A market where large number of buyers and sellers dealing in Homogeneous product with perfect knowledge is called

(a) Imperfect competition (b) Monopoly

(c) Perfect competition (d) Monopolistic competition

5. In which market, single market price prevails for the commodity

(a) Monopoly market (b) Oligopoly market

(c) Duopoly market (d) Perfect competition market

6. The Price determined in the very short period is known as_____.

(a) Secular price (b) Normal price

(c) Market price (d) Short run price

7. In which period, the supply of commodity is fixed

(a) Short period (b) Long period

(c) Very short period (d) Very long period

8. Charging very high price in the beginning and reducing it gradually is called

(a) Differential pricing (b) Sealed bid pricing

(c) Skimming pricing (d) Penetration pricing

9. If monopoly arises on account of legal support or as a matter of legal Privilege, it is called as

(a) Private monopoly (b) Government monopoly

(c) Legal monopoly (d) Single price monopoly

10. Under which pricing method, price just equals the total cost

(a) Marginal cost pricing (b) Cost plus pricing

(c) Full cost pricing (d) Going rate pricing

11. _____ is a place in which goods and services are bought and sold.
(a) Factory (b) Workshop
(c) Market (d) Warehouse

12. _____ is the example for perishable goods.
(a) Pens (b) Belts
(c) Vegetables (d) Cloths

13. _____is a form of market organization in which
There is only one seller of the commodity.
(a) Perfect Competition (b) Duopoly
(c) Monopoly (d) Oligopoly

14. If average Revenue is greater than the Average cost, monopolist
Earns __ .
(a) Loss (b) No loss No profit
(c) Profit (d) None

15. The firm is said to be in equilibrium, when it's Marginal Cost (MC)
Equals to___ .
(a) Total cost (b) Total revenue
(c) Marginal Revenue (d) Average Revenue

16. _____ is a position where the firm has no incentive either
to expand or contrast its output.
(a) Maximum output (b) Minimum output
(c) Equilibrium (d) None

17. Marginal revenue, Average revenue and Demand are the same
in _____ Market Environment
(a) Monopoly (b) Duopoly
(c) Perfect Competition (d) Imperfect Competition

18.The 'Law of Variable Proportions' is also called as _____.
(a) Law of fixed proportions (b) Law of returns to scale
(c) Law of variable proportions (d) None

19.When Proportionate increase in all inputs results in less than Equal Proportionate increase in output, then we call _____.
(a) Increasing Returns to Scale (b) Constant Returns to Scale
(c) Decreasing Returns to Scale (d) None

20. How many stages are there in 'Law of Variable Proportions'
(a)5 (b)2 (c)4 (c)2

Note –ans are "C"

Unit- 4 Financial Accounting

1.The concept that the accounting describes information that is verifiable and faithful representation of firm's financial performance is called
a. Reliabilityb. Relevancec. Consistencyd. comparability
2. An accounting principle that requires recognition of revenue at the time of it is earned called

a.Prudence principleb. Realisation principlec. Matching principled. Cost principle
3. The residual interest in the assets of the enterprise after deducting all its liabilities is called
a. profitb. revenuec. gaind. equity
4. The recognition of expense that has not been paid or a revenue that has not been received is called
a. Accrualb. Provisionc. Reserved. Deferral
5. The sequence of accounting processes beginning with the analysis and the journalizing of transaction and ending with the post closing of trial balance is called
a. postingb. tallyingc. accounting cycled. adjusting entries
6. Cash Book is
a. a ledger a/cb. Journalc. served the dual purpose of Journal and ledger accountd. Nominal account
76. The two parts of owner's equity are
a. Assets and Liabilitiesb. Net income and Common Stockc. Contributed capital and retained earnings
d. Revenue and expenses
8. Which financial statement is based on the accounting equation?
a. Income statementb. the Balance sheetc. the statement of cash flowsd. Statement of changes in shareholder's equity
9. A chronological record of transaction entered into by a business is called
a. Accountb. ledgerc. Journald. posting
10. Debit what comes in and credit what goes out is the rule for
a. Real accountsb. Nominal accountsc. Personal accountsd. Trading a/c
11. Debit all expenses and losses credit all gains and profits is the rule for
a. Real accountsb. Nominal accountsc. personal accountsd. Furniture a/c
12. Which of the following is an essential characteristic of an asset?
a. An asset is obtained at a costb. An asset provides future benefitc. An asset is tangibled. Asset is immeasurable
13. Financial statements are
a. Cash a/c and creditors ledgerb. Real and Nominal A/csc. Personal and Impersonal A/cs
d. Profit & Loss A/c and Balance Sheet
14. Contra entries are found only in
a. personal accountsb. Cost accountsc. Cash bookd. Balance sheet
15. The source of enterprise resources obtained from non-owners is
a. liabilitiesb. assetsc. capitald. profit
16. Cash in hand is classified into

a. Real accountb. Nominal accountc. Personal accountd. Trading account
17. Debit the receiver and credit the giver is the rule for
a. real accountsb. nominal accountsc. personal accountsd. stationary account
18. Impersonal accounts are
a. Profit and Loss A/csb. Trading A/csc. Real accounts and Nominal accountsd. Balance Sheet
19. The itemized list of all ledger balances, cash balances at the close of the accounting year is used to prepare
a. Trial Balanceb. Trading A/cc. Profit and Loss A/cd. Balance sheet
20. The statement of th e sources and the ways in which these resources are invested at a specified date is shown in
a. Profit and Loss A/cb. Trading A/cc. Balance Sheetd. Trial ba

Ans are “c” for all

1.Which ratio is meaningless in a start up company that has not yet earned profit?

a. P/E ratiob. Gross profit ratioc. inventory turn over ratiod. Current ratio

2. The set of ratios that measure the company's ability to meet its long- term obligation and to survive over a long period of time is known as

a. liquidity ratiosb. profitability ratiosc. market indicatorsd. solvency ratios

3. The set of ratios that measure the operating or income performance of a company is know as

a. profitability ratiosb. liquidity ratiosc. solvency ratiosd. market indicators

4. The set of ratios that relate the current market price of the company _ s stock to earning is

a. profitability ratiosb. solvency ratiosc. activity ratiosd. market indicators

5. The level of different activities in business is measured using

a. profitability ratiosb. turnover ratiosc. market indicatorsd. solvency ratios

6. The general norm for current ratio is

a. 2:1b. 1:1c. 1:2d. 0.5:2

7. Reddy & Reddy C0 reported a P/E ratio of 50 on the last day of the financial year. If the company reported earning of Rs.2.50 per share, what was the price at which share of the company being traded at that time?

a. Rs. 20 per shareb. Rs. 125 per sharec. Rs. 50 per shared. Rs. 47.50 per share

8. On Mar 31, Naidu caterers reported total current assets of Rs. 45,000 total assets of Rs. 2,00,000 total current liabilities of Rs. 42,000 and total liabilities of Rs.80,000. How much net working capital did Naidu caterers have at that time?

a. Rs. 87,000b. Rs.2,00,000c. Rs.3000d. Rs. 1,23,000

9. If a firm has Rs . 1,00,000 debt and Rs. 1,00,000 equity then

a. the return on equity is 1b. the debt to equity ratio is 1c. the return on assets ratio is 0.5

d. the firm has too much debt

10. Adjusted net profits by capital employed gives

a. ROIb. ROCEc. ROEd. EPS

11. The net profits available to equity shareholders to the amount invested by them is

a. ROIb. ROCEc. ROEd. EPS

12. Financial institution insist on minimum debt to equity ratio of

a. 2:1b. 1:2c. 1.5:2d. 2: 0.5

13. The ratio between cost of goods sold plus operating expenses and net sales is known as

a. Gross profit ratiob. Net profit ratioc. Operating ratiod. Overhead ratio

14. If the current market price of share whose face value at Rs. 10 is Rs.150, and if the company declares dividend of 45% then the dividend yield is

a. 3 per annumb. 45 per annumc. 30 per annumd. 15 per annum

15. If operating ratio of a company is 92% with a sale of Rs.50,00,000 the profitability per cent ratio is

a. Rs.8,00,000b. Rs. 4,00,000c. Rs.46,00,000d. 92%

16. The price/earning ratio of a company is 30. The company earned Rs. 15 per share for theyear ended. As on that whatw as the price of share in rupees?

a. 450b. 3000c. 150d. 2000

17.The ratio of nominal or face value of the sh are by market price of the share expressed as percent of dividend per annum is

a. EPSb. P/E ratioc. Dividend yieldd. earning power

18. The ratio between net profit before interest and taxes to fixed interest charges is known as

a. Debt equity ratiob. Net profit ratioc. Gross profit ratiod. Interest coverage ratio

19. Dividend yield is basically

a. Profitability ratiob. Solvency ratioc. Activity ratiod. Liquidity ratio

20. Low capacity utilization is revealed by

a. quick ratiob. fixed asset turn over ratioc. debt equity ratiod. collection period

Note- Ans are C

Tutorial sheet

1.Explain the various types of business entities.

2.Explain the significance of Economics and its types.

3.Describe in details about inflation and money supply in inflation .

4.Explain the features and phases of business cycle .

5.Explain the various methods of demand forcastings?

6.Define production function, explain is equate and is cost curves.

7. Explain the importance and uses of production function in break-even analysis.

8.Generalise the following transactions and post them to ledger.

i. Ram invests Rs.10,000 in cash.

ii. He bought goods worth Rs. 2,000 from Shyam.

iii. He bought a machine for Rs. 5,000 from Lakshman on account.

iv. He paid to LakshmanRs. 2,000

v. He sold goods for cash Rs.3,000

vi. He sold goods to A on account Rs. 4,000

vii.He paid to Shyam Rs.1,000

viii.He received amount from A Rs.2000

9.Calculate (a) Net Sales to Fixed Assets (b) Net Sales to Inventory (c) Net Profit Ratios given the following and explain their significance in decision making.

Net Sales 10,00,000, Fixed Assets 8,00,000, Inventory 2,20,000 Net profit after taxes 69,840

10.Determine Average Collection period:

Total sales:Rs.l,00,000 out of which credit sales were Rs.80,000

Debts receivable at the end of the year:Rs.15,000

Bills receivable:Rs.5,000. Assume the no. of working days as 360.