DR. A P J ABDUL KALAM UNIVERSITY, INDORE

SYLLABUS

For

DIPLOMA in AUTOMOBILE ENGINEERING

(PART TIME)

(Forth YEAR, 7th SEM)

College of Polytechnic Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Diploma in Automobile Engineering (Part Time)

List of Subject (FOUTH YEAR, 7th Sem)

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Sub Code: PTAE 701 Sub Name: HYDRAULIC AND PNEUMATIC CONTROL SYSTEMS 6 Credits

Unit 1: INTRODUCTION

Fluid properties density, sp. Weight, specific. gravity, viscosity, continuity equation, energies of flowing fluid. Potential, kinetic and pressure energy., Concept of datum pressure, velocity and total head of a fluid particle in motions, Bernoulli's theorem and equation. Simple problems based on use of formula only.

Unit 2: FLOW MEASUREMENT

Orifice meter, pitot tube, flow nozzle, venturimeter, their working principle, constructions and formula for discharge measurement, practical applications of above meters, Simple problems based on use of formula only.

Unit 3: PRESSURE MEASUREMENT

Concept of pressure, intensity of pressure, pressure head, gauge pressure, vacuum pressure, absolute pressure manometer pressure, simple U-tube manometer, differential manometer, Simple numerical problems based on use of formula only.

Unit 4: HYDRAULIC PUMPS

Centrifugal and reciprocating pumps, their principle construction, working classification and layout, Their comparison, specific speed, selection of pumps, pump operating characteristics, Formula for horse power and efficiency of centrifugal pump. Simple numerical problems based on use of formula only.

Unit 5: HYDRAULIC CONTROL SYSTEMS

Purpose, function, layout of simple hydraulic system, components viz pump motor, pressure regulator, fluid filter control valve, cylinder, pipes and hoses linear/rotary actuators piston pump, switch plate pump. Comparison of different types of pumps.

Unit 6: HYDRAULICS VALVES

Purpose, types ,infinite position valve and finite position valve, 4/3 valve, double acting hydraulic cylinder check valves, poppet valves, spool valves, rotary valves, pilot valves, proportional valves electro hydraulic valves,(Solenoid valves) Servo valve.

Unit 7:HYDRAULIC ACTUATORS

Functions, single cylinder piston arrangement, linear actuators, gear motor. Single acting and double acting actuators.

Unit 8:PNEUMATIC CONTROL SYSTEM

Pneumatic system components, air filter, compressor, air treatment unit, reservoir, on /off control valve, pressure regulator air control valve, actuators, four types of linear actuators, single rod single acting, single rod double acting, double rod double acting, road less double acting, comparison of pneumatics system with hydraulics system, procedure of air treatment. Process control pneumatics.

Unit 9:LOGIC CONTROL SYSTEM

Introduction to development of various types of simple logical control system in pneumatic or hydraulics mode.

List of Experiments

1 Study of various types of oil pumps
2 Study of hydraulics control system components.

3 Study of Hydraulic valves.

4 Study of Hydraulics actuators

5 Study of pneumatic control system components

6 Study of any logic controlled system based on hydraulics mode

7 Study of any logic controlled system based on pneumatic mode

REFERENCE BOOKS

1. Fluid Mechanics & Hydraulics Machines by Dr. R.K. Bansal
2. Fluid Mechanics & Hydraulics Machines by Modi and seth
3. Fluid Mechanics & Hydraulics Machines by Jagdish lal
4. Fluid Mechanics & Hydraulics Machines by A.K.Jain
5. Refrigeration's & Air conditioning by R.S. Khurmi
6. Fluid power and trouble shooting by Hohn A.H.
7. Fluid power theory and application by James A Sullivan
8. Pneumatic control and system by Mazumdar

Unit 1: Introduction:
Definition of industry and industrial engineering, scope and role of industrial engineering fields of applications.

Unit 2: Productivity:
Production and productivity, production systems and their impact on productivity, its significance and benefits of higher productivity. Long term and short term factors affecting productivity, productivity cycle.

Unit 3: Work Study:
Introduction, its relation with productivity aims, objectives and application of work study, basic procedure and techniques of work study . Human factors in work study. Role of manager, supervisor and workers. Working conditions, environment of industry affecting work study.

Unit 4: Method Study:
Definition objectives, basic procedures of methods study. Recording techniques, operation process chart, flow process chart, machine chart, flow diagrams, string diagrams, two hand process charts, questioning technique procedure to develop, install and maintain new methods.

Unit 5: Principles of Motion Economy:
Meaning, basic rules design of efficient work place- layout, classification of human body movements and their preferred order.

Unit 6: Material Handling and Plant Layout:
Importance and its effects on productivity, requirements of good material handling system, classification and selection of material handling equipment. Requirements of good layout. Effect of bad layout, Factors affecting plant layout, types of layout, advantages and limitations of each type of layout selection of layout, factors affecting the plant location.

Unit 7:Micro Motion Study:
Definition and objectives, techniques of micromotion study, therbligs and their symbols, use of therbligs, SIMO chart and its application.

Unit 8:Work Measurement:
Definition, Basic procedure and technique to work measurement. Stop watch time study, types of stop watch study, factors considered in selecting a job for time study, qualified and representative workers, procedure of stop watch time study, job element and their need of identification, general rules for break down of job into elements, work cycle, methods of time measurement, performance rating, its meaning, standard rating , rating of operators, conditions for operators variation at work place rating scales, rating factors, calculation of basic time. Allowances- purpose, types. Calculation of standard time synthesis method-meaning, data, complication, advantages and limitations. **PMTS-** Definition principle and use, calculation of standard time. **MIM -** Meaning, tables and use. Application of MIM analysis for LH-RH charts, calculation of standard time. **Work/ Activity Sampling:** Definition, statistical basics, determination of number of observation for given accuracy, sources of error, application and calculation of standard time.

Unit 9:MOST Technique for work measurement:
Definition of terms, concept of the MOST, Basic MOST sequence models, Time Units, Parameter Indexing, Method Accuracy and Sensitivity, Levels of Work Measurement, Compatibility of MOST systems, Application of MOST

Unit 10:Job Evaluation, Wages and Incentives:

Definition, need and scope of job evaluation. Job evaluation systems and their comparative merits and demerits and limitations. **Wage:** Definition, wage components, wage fixation, real, minimum and fair wage. Financial and non- financial incentives and their examples. Wage plans- Halsey, Taylor, differential plan, Gantt task and bonus plan, 100 % premium plan.

Unit 11:Statistical Quality Control:

Definition of quality and total quality, three stages of quality, quality control and SQC, difference between inspection and quality control, concept of variability, natural variation, its importance to quality control , classification of quality, characteristics, basic tools of SQC and their application, frequency distribution, measures of central tendency and dispersion, their need and calculations. Normal Curve : Definition, characteristics, calculation of area under normal curve and its application, statistical tolerance their calculation and application. Process capability meaning calculation and use.

Unit 12:Control Charts for Variables:

Statistical basic for control Charts for variables, construction of X and R Charts- their interpretation, use of X and R chart in establishment of process capability.

Unit 13:Control Charts for Attributes:

Limitation of X and R charts, Meaning and use of attributes, their advantages, Calculation, construction, interpretation and application of p- chart, c- chart, ph-chart. Need of calculating the revised values of mean, and control limits and their calculation.

Unit 14:Acceptance Sampling:

Meaning different techniques procedure involved sampling inspection meaning and comparison with 100 % inspection. Factors affecting sampling and their effects. Single and double sampling plans, use of IS codes. O.C. Curves : Meaning, terms used, their definition, construction and use of O.C. curves. Selection of sampling plans.

Unit 15:Reliability:

Definition quality control and reliability factors affecting reliability of product. Measures to ensure reliability of product, effect of product reliability marketing. M.T.B.F and M.T.T.F. Definition programme for reliability. Maintainability and availability

LIST OF EXPERIMENTS

1 Preparation of flow process chart for existing and improved process.
2 Preparation of man and machine chart for existing and improved process.
3 Preparation of L.H. and R.H. charts for existing and improved process.
4 Use of decimal minute watch.
5 Performance rating.
6 Establishing standard time for given operation using time study techniques.
7 Use of Shewharts bowl and actual production for frequency distribution.
8 Preparation of X and R charts.
9 Preparation of p- chart and c- chart.
10 Work measurement using MOST
11 Acceptance sampling by attributes (single and double sampling plans)
12 Determination of the percentage utilization of equipment (work sampling) .
13 Application of principals of motion economy

REFERENCES

1 Introduction To Industrial Engineering by Philip Hicks (McGraw Hills)
2 Productivity Means Property (Asian Productivity Organisation, Tokyo)
3 Introduction To Work Study (International Labour Office)
4 Work Study by M.D. Schmid & Subrammaniam
5 Motion and Time Study by Ralph M. Barnes John Willey New York
6 Work Study by Dalela.
7 Wage Administration by D.K. Roy. (N.P.C. Publication).
8 Quality Assurance Engineering by M.D. Schmid & Subramaniam.
9 S.Q.C. by E.L.Grant.
10 S.Q.C. by R.C. Gupta.
11 Industrial Engineering & Management by O. P. Khanna.
12 Industrial Engineering by Saxena.
13 MOST Work Measurement Systems, Kjell B. Zandin, Marcel Dekkar Inc. New York
14 Material Handling Equipment (N. Rudenki Place Pub)
15 Learning Package In Industrial Engineering by O.D.C. , T.T.T.I Bhopal .
16 Laboratory Manual Industrial Engineering by O.D.C. , T.T.T.I Bhopal .
17 Audyogiki Abhiyantran (Hindi) by J.C. Varshneya. (Deepak Prakashan, Gwalior)
18 Audyogik Engineering (Hindi) by K.D. Saxena . (Deepak Prakashan, Gwalior)
York, 3rd edition,.
5. Judge A.W "Modern Electrical Equipment of Automobiles", Chapman & Hall, London,.
6. Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi,.
7. Robert Bosch "Automotive Hand Book", SAE (5th Edition),.
8. Ganesan.V. "Internal Combustion Engines", Tata McGraw-Hill Publishing Co., New Delhi,

Sub Code: PTAE 603 **Sub Name:** VEHICLE EMISSION CONTROL **5 Credits**

Unit 1: INTRODUCTION

Environment, Atmosphere, Clean air, Pollution, different types of air pollution. Effect of pollution on human health. Role of vehicles in air pollution, Two types of vehicle emissions viz unburned hydrocarbons and exhaust emissions. Brief history of automobile emission control. Emission norms- Euro and Bharat. Role of state administration to control vehicle emissions.

Unit 2: POLLUTANT FORMATION IN SI & CI ENGINES

Pollutant formation in SI Engines, mechanism of HC and CO formation in SI engines, NOx formation in SI engines, effects of design and operating variables on SI engine emission, Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions.

Unit 3: UNBURNED HYDROCARBON EMISSION CONTROL EVAPORATIVE EMISSION CONTROL

Sources of vapor leakages, Need of vapor recovery systems such as fuel vapor return line, charcoal canister, vapor separation from fuel, sealed fuel tanks, Carburettor insulation, vapor storage in crank case, Expansion tank.

CRANKCASE BLOWBY

Need of removing blowby gases, Open & Closed crankcase ventilation
system, function of PCV valve, Construction & working of PCV valve.

Unit 4: EXHAUST EMISSION CONTROL

Composition of exhaust gases, Pollutants in exhaust. Exhaust emission control methods – Air injection, catalytic converter - two way & three way converter, catalysts, Exhaust gas recirculation, function of EGR valve.

Unit 5: ENGINE DESIGN MODIFICATIONS TO REDUCE EMISSIONS

Various methods to improve combustion quality such as efficient control of A/F Ratio, faster acting choke, reducing combustion chamber surface area, compression ratio, increasing combustion temperature, valve overlap, control of vacuum advance, Electronic engine control and microprocessor based engine control, Non conventional vehicles.

Unit : EXHAUST MEASUREMENT

Concept of exhaust measurement for S.I and C.I engines, smoke testing for S.I and C. I. engines. Measurement of CO, HC and NOx. Smoke meters – Hartridge & Bosch type, Flame ionization detector (FID), Spectroscopic gas analysers – Non dispersive infrared gas analysers (NDIR).

LIST OF EXPERIMENT

1 Study of Exhaust Gas Analysis regarding its working principles construction, components and operation.

2 Study of Smoke meter regarding its working principles construction, components and operation

3 Measurement of Exhaust gases viz. CO, NOx and HC by gas analyzer.

4 Measurement of smoke level in exhaust of any vehicle.

5 Study of E G R system.

6 Study of P C V system

7 Study of Catalytic converter

REFERENCES

1. Paul Degobert – Automobiles and Pollution – SAE International ISBN-1-56091-563-3,
2. Ganesan, V- "Internal Combustion Engines"- Tata McGraw-Hill Co.
3. Automotive machines- W. H. Cruse.
4. I C Engine by Sharma and Mathur
5. SAE Transactions- "Vehicle Emission"- (3 volumes).
6. Obert. E. F.- "Internal Combustion Engines"
7. Marco Nute- " Emissions from two stroke engines, SAE Publication

Sub Code: PTDC 9999 Sub Name: Professional Activities 0 Credits

OBJECTIVES:
THE STUDENTS WILL BE ABLE TO:
1. Developing working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

1 SOCIAL SKILLS
SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY

2 Swot Analysis – Concept, How to make use of SWOT

3 Inter personal Relation- Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.

4 Problem Solving
I) STEPS IN PROBLEM SOLVING- identify and clarify the problem, information gathering related to problem, evaluate the evidence, consider alternative solutions and their implications, choose and implement the best alternative, review
II) Problem solving technique.(any one technique may be considered)
1) Trial and error, 2) Brain storming, 3) Lateral thinking

5 Presentation Skills
Body language -- Dress like the audience, Posture, Gestures, Eye contact and facial expression.
Presentation Skill- Stage Fright, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board

6 Industrial Visits Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. **TWO** industrial visits may be arranged in the following areas / industries :

i) Manufacturing organizations for observing various manufacturing processes including heat treatment ii) Material testing laboratories in industries or reputed organizations iii) Auto workshop / Garage iv) Plastic material processing unit v) ST workshop / City transport workshop

ii)

7 Lectures by Professional / Industrial Expert be organized from Any Three **of the following areas :** i) Use of a plastics in automobiles. ii) Nonferrous Metals and alloys for engineering applications iii) Surface Treatment Processes like electroplating, powder coating etc. iv) Selection of electric motors. v) Computer aided drafting. vi) Industrial hygiene. vii) Composite Materials. viii) Heat treatment processes. ix) Ceramics

8 Individual Assignments:

Any two from the list suggested

a) Process sequence of any two machine components. b) Write material specifications for any two composite jobs. c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications. d) Preparing models using development of surfaces. e) Assignments on bending moment , sheer forces , deflection of beams and torsion chapters of strength of material. f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable. g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat

treatment processes. h) List the various properties and applications of following materials – a.Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers.

OR

Conduct **ANY ONE** of the following activities through active participation of students and write report

i) Rally for energy conservation / tree plantation. ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc. iii) Conduct aptitude , general knowledge test , IQ test iv) Arrange **any one** training in the following areas : a) Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances.

9 Group discussion and Interview technique – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are - i) Sports ii) Current news items iii) Discipline and House Keeping iv) Current topics related to Electrical engineering field.

Interview Technique Necessity, Tips for Handling Common Questions

10 Working in Teams

Understand And Work Within The Dynamics of A Groups. Tips to Work Effectively In Teams, Establish Good Rapport, Interest with others and work, Effectively with Them to Meet Common objectives, Tips to Provide and Accept Feedback in A Constructive and Considerate Way, Leadership In Teams, Handling Frustrations in Group.

11 Task Management -Introduction, Task identification, Task planning, organizing and execution, Closing the task

Assignment: (Any Eight Assignments)

1) SWOT analysis: - Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT. a) Your past experiences, b) Achievements, c) Failures, d) Feedback from others etc. 2) undergo a test on reading skill/memory skill administered by your teacher. 3) Solve the puzzles. 4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group) 5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher. 6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.#### 7) Conduct an

interview of a personality and write a report on it. 8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed 9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

MINI PROJECT ON - task management. Decide any task to be complete Stipulated time with the help of teacher. Write a report considering various steps in Task management.

Reference Books

1 Marshall Cooks Adams Time management Viva Books
2 E.H. Mc Grath , S.J. Basic Managerial Skills for All Pretice Hall of India, Pvt Ltd
3 Allen Pease Body Language Sudha Publications Pvt. Ltd.
4 Lowe and Phil Creativity and problem solving Kogan Page (I) P Ltd
5 by Adair, J Decision making & Problem Solving Orient Longman
6 Bishop , Sue Develop Your Assertiveness Kogan Page India
7 Marion E Haynes Make Every Minute Count Kogan page India
8 Steven L McShane and Mary Ann Glinow Organizational Behavior Tata McGraw Hill
9 Stephen P. Robbins Organizational Behavior Pretice Hall of India, Pvt Ltd
10 Michael Hatton Presentation Skills (Canada – India Project) ISTE New Delhi
11 Stress Management Through Yoga and Meditation Sterling Publisher Pvt Ltd
12 Richard Hale ,Peter Whilom Target setting and Goal Achievement Kogan page India
13 Chakravarty, Ajanta Time management Rupa and Company
14 Harding ham Working in Teams A Orient Longman

INTERNET ASSISTANCE

1. http://www.mindtools.com
2. http://www.stress.org
3. http://www.ethics.com
4. http://www.coopcomm.org/workbook.htm
5. http://www.mapfornonprofits.org/
6. http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7. http://eqi.org/
8. http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9. http://www.mapnp.org/library/ethics/ethxgde.htm
10. http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11. http://members.aol.com/nonverbal2/diction1.htm
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. http://snow.utoronto.ca/Learn2/modules.html
14. http://www.quickmba.com/strategy/swot/