AU/IP/ ME/TX- 601 – Operations Management

Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

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

Unit 5

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

References:

1. Chary SN; Production and Operations Management; TMH
2. Hopp W and Spearman M; Factory Physics; TMH
3. Gitlow Howard et al; Quality Management; TMH

4. Khanna RB; Production and Operations Management; PHI
5. Vollman, berry et al; Manufacturing planning and control for SCM; TMH.
6. Chase Richard B et al; Operations management; SIE-TMH

AU/IP - 602 Total Quality Management and SQC

Unit 1

Evolution of total quality management, historical perspective, teamwork, TQM and ISO 9000; information technology and Business Process Re-engineering (BPR); TPM and quality awards; aids and barriers to quality mgt, creating vision and initiating transformation, establishing programs for education and self improvements, measurement of key indicators; quality mgt leader; cross functional teams and coordination, policy setting and review, flowchart of policy mgt and relation with daily mgt.

Unit 2

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

Unit 3

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

Unit 4

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

Unit 5

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

References:

1. Gitlow HS, Oppenheim et al; Quality Management; TMH
2. Juran J. M., Quality Planning and Analysis
3. Sharma P. D, TQM, Sultanchand
4. Naidu Babu and Rajendran; TQM; New age International pub;
5. 5. Chase Richard B et al; Operations management; SIE-TMH
6. Chary SN; Production and Operations Management; TMH
7. Quality Management by Howard S Gitlow, TMH

AU-603 Automotive Electrical & Electronics

Unit 1

Automotive batteries: Starter batteries- principle, construction & operation of lead-acid battery; battery capacity, efficiency & rating; tests on batteries; charging methods; battery faults; battery maintenance; maintenance-free batteries; Traction batteries: Applications; electric traction; electric drive vehicle layout.

Unit 2

Starter and charging systems: Requirements; principle, construction & working of starter motor; starting motor drive mechanisms; starter switch; starting system faults; Generating system: Working principle of dc generator & ac alternator; armature reaction; cut-out relay; voltage & current regulator systems.

Unit 3

Lighting and auxiliary systems: Development of lighting technology; principle of automobile illumination; head lights; tail lights; traffic lights; Auxiliary systems: Speedometer; electric horn; wind screen wipers; alarm systems; central locking system; immobilizer system; power windows; different types of gauges.

Unit- 4

Electronic engine control and sensors: Need of electronic engine control; engine functions & control; electronic fuel control system; basic sensor arrangement; sensors & actuators; types of sensors-oxygen sensor, vehicle speed sensor, detonation sensor, maf sensor, map sensor, rpm sensor, throttle position sensor, temperature sensor.

Unit-5

Electronic fuel injection and ignition systems: Introduction; fuel back carburetor system; throttle body injection; multi point fuel injection; Robert Bosch gasoline fuel injection system; ford electronic gasoline fuel injection system; injection system controls; Ignition systems: Introduction; advantages of electronic ignition systems; principle, operation & types of solid state ignition system, electronic spark timing control.

References:

1) Norm Chapman Delmar; Principles of Electricity And Electronics for Automotive; Cengage
2) BOSCH-SAE; Automotive Electrics & Electronics-
3) William B Ribbens- Newnes; Understanding Automotive Electronics-
4) Tom Denton; Automobile Electrical And Electronic Systems; SAE
5) Kanemitsu Nishio; The Fundamentals of Automotive Engine Control Sensors; Fontis Media

List of Experiments (Pl. expand it):

1. Study of lead acid and maintainance free batteries,
2. Study of starter and Bendix drive
3. Study of electric generation and charging systems
4. Study of lighting systems;
5. Study of electronic fuel injection systems
6. Study of various sensors and detectors
7. Study of vehicles control systems

AU - 604 Automotive Design & Assembly Drawing

Unit-1
Cam design: Introduction, cam terminology, types of cam ,follower and follower motions. Motion constraints, svaj diagrams, single-dwell and double-dwell cam design. Critical path motion, pressure angle and radius of curvature of cam motion; introduction of SOHC and DOHC.

Unit-2
Clutch design: Definition, classification and requirement of clutch, design equation for power transmission and clutch dimensions for single plate ,multi plate, centrifugal and cone clutch.

Unit-3
Brake design: Definition, classification and requirement of brake, energy absorption and heat dissipation through brake, design of shoe brake and double shoe brake, internal expanding brakes, band and block brake and disc brake.

Unit-4
Design of suspension spring and front axle: Types of suspension system, types of suspension springs, design of leaf spring, coil spring; design of front axle beam.

Unit-5
Design of i.c engine parts: introduction to principle parts of an I.C engine, design of cylinder and cylinder liner, piston, connecting rod, crank shaft (calculation for bearing pressure and stresses in crank shaft); design of valves; vehicle design and data characteristics.

Unit-6
Assembly drawings: engines, chassis and other automobile systems.
a) Piston Assembly
b) Connecting Rod Assembly
c) Shackle Assembly
d) Wheel Cylinder Assembly
e) Master Assembly

References:
1. Bhat, ND; Machine Drawing; Charotar
2. Machine Drawing by K R Gopal Krishna, Subhash Publication, Bangalore
3. Automotive Engineering by Drawing by R B Gupta
4. Singh A; Machine Drawing; TMH
5. Narayana and Reddy; Machine Drawing; New age, Delhi.
6. Agarwal and agrawal; Engineering Drawing; TMH
7. Shigley JE et al; Mechanical Engineering Design, TMH
8. Kulkarni SG; Machine Design; TMH
9. Mubeen and Mubeen; Machine Design.
10. Luzzader WJ, Duff JM; Fundamental of Engg Drawing and Interactive Graphics; PHI.

List of Experiments (Pl. expand it):
Design & Drawing of the above mentioned components & assemblies.

AU - 605 Automotive Chassis systems

Unit 1
Automotive chassis: Definition; chassis layout; types of chassis layout with reference to power plant location, steering position and drive on wheels; chassis components; chassis classification; Automotive frames: Construction; functions; loads acting; materials; types; frame cross sections; frame diagnosis and service; dimensions of wheel base; wheel track; chassis overhang and ground clearance.

Unit 2
Front axle & steering system: Functions, construction & types of front axle; front wheel geometry; front wheel drive; steering mechanisms; steering linkages & layout; types of steering gear boxes; power & power assisted steering; electronic steering; four-wheel steering; terminology-reversible steering, under-steering, over-steering, turning radius.

Unit 3
Suspension system: Need; factors influencing ride comfort; types; suspension springs-leaf spring, coil spring & torsion bar; spring materials; independent suspension; rubber suspension; pneumatic suspension; hydraulic suspension, shock absorbers-liquid & gas filled.

Unit 4
Braking systems: Introduction, principles of braking; classification; brake actuating mechanisms; Drum brake- theory; principle; construction; working; Disc brake- theory, principle, construction, working; Parking brake- theory, principle; construction, types; Hydraulic system- theory, principles, master-cylinder basics, wheel-cylinder basics, tubing & hoses, valves & switches, brake fluid; Power brake- theory, vacuum-booster basics, hydraulic-booster basics, electro-hydraulic booster basics; Advanced brake theories; Exhaust brake; abs technology; factors affecting brake performanceoperating temperature, area of brake lining, clearance.

Unit 5
Wheel: Forces acting on wheels, construction of wheel assembly, types- spoke, disc & built-up wheels; wheel balancing; wheel alignment; Tyres: Static & rolling properties of tyres, construction details, types of tyres- pneumatic & hydraulic; types of tyre-wear & their causes; tyre rotation; Bearings: Functions; classification of bearings; bearing materials; automotive bearings.

References:
1) Giri NK; Automobile Technology; Khanna Publishers
2) Reimpell/Stoll/Betzler; The Automotive Chassis; SAE
3) Thomas W Birch- Delmar; Automotive Chassis Systems; Cengage Learning
4) Halderman/Mitchell; Automotive Technology; Prentice Hall
5) Don Knowles; Automotive Suspension & Steering Systems; Today's Technician
6) Jack Erjavec- Delmar; Automotive Technology; Cengage Learning

List of Experiments (Pl. expand it):
1 Study of types of chassis layouts.
2. Study and Construction of front axle
3. Study and Construction of steering linkages.
4. Study and Construction of rigid axle suspension system.
5. Study and Construction of independent suspension system.
6. Study and Construction of disc & drum brake assemblies..