

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; Little's 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

TX- 602 – Fabric Structure and Design II

Unit I

Figuring with extra warp and extra weft, backed fabrics- warp and weft backed fabrics and reversible backed fabrics, double cloth and its varieties.

Unit II

Velveteen and corduroy fabrics, real velvet terry and warp pile fabric structure.

Unit III

Introduction to gauge and leno structures, methods of producing leno fabric, design, draft & peg-plan of leno structure; point paper designing of jacquard fabrics.

References:

1. Grosicki Watsons; Advanced textile design
2. Nisbet; Grammer of textile design;

TX- 603 – Textile Testing - II

Unit I

Evenness testing– Concepts of evenness, index of irregularity, nature and causes of irregularity, length–variance curve, methods of measuring and assessing irregularity, evaluation and interpretation of test results, spectrograph, analysis of spectrograph, like periodic fault, drafting wave, peaks, effects of irregularities.

Unit II

Tensile testing of yarn and fabric, terms and definition with their importance, concept and application of CRL, CRE and CRT principle, factors affecting the result of tensile experiments, loads-elongation curve and its conversion to stress-strain curve, tensile properties-terms and definition and their units, experimental methods, effects of different variability on the tensile properties, different models to represent the tensile behavior of visco-elastic material, concept of mechanical setting of textile material.

Unit III

Fabric testing– measurement of physical parameters e.g., length, width, weight/length, thickness, crimp, etc. Importance of measuring equipments of fabric properties e.g. drape, handle, stiffness, crease recovery, pilling, wear and abrasion.

Unit IV:

Bursting test, air permeability, water permeability, water-proof-ness, tearing strength, shrinkage, grab test, color fastness tests– washing, rubbing, sublimation, perspirations, dry cleaning, flammability test- assessment of aesthetic of fabrics by Kawabata, first systems

References:

1. Booth J.E; Principle of Textile Testing
2. Grover BE and Hamby DS; Handbook of Textile Testing & Quality Control
3. Kothari VK; Progress in Textiles Science and Technology–Vol.1, Testing & Quality Management;
4. Morton & Hearle; Physical properties of Textile Fiber-
5. Angappan P, R. Gopalakrishnan; Textile Testing;
6. Mehta Pradip V and Bhardwaj Satish K; Management of Quality in the Apparel industry;

List of Experiments (Pl. expand it): Textile Testing–II

Determination of irregularity of sliver, roving and yarns, measurement of yarn strength (single yarn & lea) and elongation by different testers, calculation of CSP, Young's Modulus, Yield points and work of rupture, different fabric testing.

1. Determination of Fabric tensile strength (strip) & elongation
2. Determination of Fabric strength (Grab method)
3. Determination of Fabric tearing strength
4. Determination of Bursting strength of fabric
5. Determination of Fabric crease recovery
6. Determination of Fabric stiffness
7. Determination of Air permeability of fabrics
8. Determination of Water repellency of fabrics
9. Determination of Pilling resistance of fabrics
10. Determination of Abrasion resistance of fabrics
11. Determination of Single yarn strength, Lea strength
12. Determination of Work of rupture of yarn and fabric

TX- 604 – Fabric Manufacturing III

Unit I

Let-off motion- positive/controlled, warp tension control, electronic let-off motions, working principles and features of Ruti, Bartlet and Saurer let-off motions.

Unit II

Automatic looms, different types of mechanical feelers e.g. sweep, diameter gauge and penetration gauge and electrical & electronic feelers, pirn changing and shuttle changing devices,

weft cutters and temple cutters, bobbin loader and unifil loom winder.

Unit III

Warp stop motion– mechanical and electrical types; **Multiple boxes**– weft patterning and mixing, different types of rising and falling multiple boxes, Cowburn & Peck (Eccles); sliding gear type multiple box motion, card saving device.

Unit IV: Mechanism for producing terry pile fabrics, different terry mechanisms, control of pile length, production of plush fabrics.

References:

1. Bannerjee NN; Weaving Vol. II;
2. Aswani.KT; Fancy Weaving;
3. Marks & Robinson; Principle of Weaving;
4. Ormerod A;Modern; Preparation & Weaving Machinery;
5. Woven Fabric Production – II - NCUTE Publication (2002) – 1st Edition
6. Dobby, Jacquard; Drop Box & Terry loom
7. Talukdar MK, Sriramulu PK, Ajgaonkar DB; Weaving Machines, Mechanisms and Management Fox; Mechanism of Weaving
8. BTRA; Loom shed –Silver Jubilee Monograph Series.
9. Hasmukharai B; Fabric Forming;
10. Joshi Hiren and Joshi Gauri; Electronic Controls for Textile Machines; NCUTE Pub.(2003)
11. Ormerod Allan and Sondhelm Walter S; Weaving Tech. & Operations;

List of Experiments (Pl. expand it):

- A: Detailed study of automatic loom along with positive let-off and work stop motion;
B: Study of multiple box mechanism and preparation of patter chain;
C: Weave analysis of complex fabrics – putting the design on graph paper and preparation of drafting and peg plan, color and weave analysis of yarn dyed varieties of fabrics. Study of sett cover, cover factor, count and weight calculations for the aforementioned fabrics.
1. Dismantle and refit drop box mechanism with proper setting and timing;
 2. Card cutting for the drop box motion;
 3. Dismantle and refit the wrap stop mechanism with proper setting and timing;
 4. Dismantle and refit Ruti let-off mechanism with proper setting and timing;
 5. Detail study of terry pile loom
 6. Dismantle and refit feeler mechanism with proper setting and timing
 7. Dismantle and refit Pirn changing mechanism with proper setting and timing.

TX- 605 – Yarn Manufacturing- III

Unit I

Ring frame– objects of ring frame, constructional details of ring frame, theory related to drafting, twisting, winding, spinning balloon, yarn tension and selection of traveler, recent development in ring spinning, compact spinning, calculations related to draft, speed, production; common defects in yarn, causes and remedies, general idea about setting parameters, environmental condition and its effects, maintenance schedule and supervisory check points, production of blended yarn/synthetic short and long staple fibre, spinning of natural, synthetic fibre, its blend in ring spinning.

Unit II

Doubling- objectives, types of doubling, merits and demerits, feed material preparation, constructional details and theory of ring doubling and TFO, developments in TFO and various type of doubling, calculation of production, twist for each case, selection of traveler and ring, general idea of material and package faults and their remedies, environmental condition and supervisory checkpoints.

Unit III

Reeling and bundling-objectives of reeling and bundling, brief idea about machines, working, merits and demerits of different types of reeling, production calculation and supervisory checkpoints

Unit IV

Introduction to woolen, semi worsted and worsted systems of spinning, jute and flax spinning and manufacturing of different types of fancy yarns.

References:

1. The Textile Institute; Manual of Cotton Spinning Volume IV, V;
2. The Textile Institute; Manual of Textile Tech. – Short Staple Spinning series – Vol.4
3. Klein W; A Practical guide to Ring Spinning
4. Kulkarni HS and Murthy HVS; Two-For-One – Technology & Technique for spun yarn;
5. Chhatopadhyaya R. (Editor); Advances in Tech. Of Yarn Production – NCUE Publication
6. Gong RH and R.M.Wright; Fancy Yarns- Their Mfg. And Application;
7. Gilbert Merrill; Cotton Ring Spinning
8. Taggart; Cotton Spinning
9. Goswami BC et al; Textile Yarns Technology, Structure & Applications
10. Salhotra KR et.al; Ring Spinning, Doubling & Twisting; NCUTE Pilot Programme Pub
11. Lawrence Carl A; Fundamentals of spun yarn tech

List of Experiments (Pl. expand it): Yarn Manufacturing- III

An elaborate study of Ring frame, Ring doubling and TFO, constructional details, setting and gauging, controls and change places, calculation of speeds, drafts and production

1. To study the general feature of a ring frame, (creel, drafting, twisting and winding zone.)
2. To study the drafting arrangement of a ring frame and to calculate drafts and draft constants.
3. To study twisting arrangement of ring frame and to calculate twist constant and spindle speed.
4. To study the package building mechanism in a ring frame.
5. To study general feature of a ring doubling machine (creel, delivery, twisting and winding zone)

6. To study gearing arrangement of a ring doubling machine and to calculate delivery roller speed
7. To study twisting arrangement of a ring doubling machine and to calculate twist constant and spindle speed
8. To study the package building mechanism in a ring doubling machine
9. To study the safety devices in ring frame and ring doubling machine.