Sri Ramakrishna Mission Vidyalaya College of Arts and Science Coimbatore – 641020

(An Autonomous College Re-Accredited with "A" grade by NAAC and Affiliated to Bharathiyar University, Coimbatore)

B.Voc., Degree course (Three years)

Production Technology (Tool & Die)

(An UGC sponsored DDU-KAUSHAL KENDRA Programme)

SYLLABUS

(ACADEMIC YEAR 2020-2021 Onwards)

Sri Ramakrishna Mission Vidyalaya College of Arts and Science
(AUTONOMOUS)

For Students admitted from 2020-2021& onwards

COURSE OF STUDY

- Syllabus is framed for B.VOC in Production Technology (Tool & Die) according to UGC norms and National Vocational Education Quality Framework
- There are 2 components. They are General components of 24 credits and Skill components of 36 credits.
- One credit is equal to 15 hours for theory and 30 hours for practical. Practical could be either in the campus or in the working place of the Industry.

ELIGIBILITY:

- Candidates who have successfully completed their Higher Secondary (10+2) will be eligible for admission.

PROGRAMME OUTCOMES:

The Department of Production Technology (Tool & Die) provides the practical learning environment for the students which aim to meet out the industrial requirements in the field of Production and Manufacturing by providing more practical exposures and on job trainings.

The program Educational Objectives are as follows:

PO1: Provide graduates with the fundamental knowledge in science and mathematics required to understand the principles of Engineering.

PO2: Develop creative and innovative thinking ability of the students which are required for industry.

PO3: Create a technically skilled employee by imparting theoretical, practical and on job training to students.

PO4: Imparting the leadership qualities required for team work, production planning, decision making and industrial safety, so that they are work ready at exit point of the programme.

PO5: Create well disciplined and responsible citizens for the overall welfare of our nation.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Ability to apply the knowledge of basic engineering principles in tool and die making.

PSO2: An ability to use the techniques, skills and modern engineering tools.

PSO3: An ability to design a system, component or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

PSO4: An ability to function on multidisciplinary teams.

PSO5: Ability to use techniques, Skills and modern engineering tools required to develop new product with updated features and improved performance.

SCHEME OF EXAMINATION

SEMESTER – I

Course code	Part	Course Title	Lecture/ Practical Hrs	Exam Hrs	Credits	Marks		
						Int	Ext	Total
GENERAL EDUCATION COMPONENT								
20KUG1TA1	I	Tamil I	60	2	4	50	50	100
20KUG1EN1	II	Basic English	60	2	4	50	50	100
20KUG1AL1	III	Allied I: Mathematics- I	60	2	4	50	50	100
Sub Total (A)			**180**	**06**	**12**	**150**	**150**	**300**
VOCATIONAL EDUCATION COMPONENT								
20KUP1C01	III	Core I: Basics of Production Engineering	60	2	4	50	50	100
20KUP1C02	III	Core II: Production Technology – I	60	2	4	50	50	100
Sub Total (B)			**120**	**04**	**08**	**100**	**100**	**200**
Total (A +B)			**300**	**10**	**20**	**250**	**250**	**500**

SEMESTER – II

Course code	Part	Course Title	Lecture/ Practical Hrs	Exam Hrs	Credits	Marks		
						Int	Ext	Total
GENERAL EDUCATION COMPONENT								
20KUG2TA2	I	Tamil II	60	2	4	50	50	100
20KUG2EN2	II	Professional English	60	2	4	50	50	100
20KUG2AL2	III	Allied II: Office Automation	60	2	4	50	50	100
Sub Total (A)			**180**	**06**	**12**	**150**	**150**	**300**
VOCATIONAL EDUCATION COMPONENT								
20KUP2C03	III	Core III: Production Technology – II	60	2	4	50	50	100
20KUPT2P1	III	Practical I: Production Technology – I	60	3	2	50	50	100
20KUPT2P2	III	Practical II: Production Technology – II	60	3	2	50	50	100
20KUPT2I1	III	Internship Training-I	1200	3	20	100	300	400
Sub Total (B)			**1380**	**11**	**28**	**250**	**450**	**700**
Total (A +B)			**1560**	**17**	**40**	**400**	**600**	**1000**

SEMESTER – III

Course code	Part	Course Title	Lecture/ Practical Hrs	Exam Hrs	Credits	Marks		
						Int	Ext	Total
GENERAL EDUCATION COMPONENT								
20KUG3EN3	II	Technical Communication	60	2	4	50	50	100
20KUG3AL3	III	Allied III: Mathematics-II	60	2	4	50	50	100
20KUG3ENS	IV	Environmental studies	60	2	4	50	50	100
Sub Total (A)			**180**	**06**	**12**	**150**	**150**	**300**
VOCATIONAL EDUCATION COMPONENT								
20KUP3C04	III	Core IV: Advanced Production Technology	60	2	4	50	50	100
20KUPT3P3	III	Practical III: Advanced Production Technology	60	3	3	50	50	100
Sub Total (B)			**120**	**05**	**07**	**100**	**100**	**200**
Total (A +B)			**300**	**11**	**19**	**250**	**250**	**500**

SEMESTER – IV

Course code	Part	Course Title	Lecture/ Practical Hrs	Exam Hrs	Credits	Marks		
						Int	Ext	Total
GENERAL EDUCATION COMPONENT								
20KUP4C05	III	Core V: Technical Drawing	60	2	4	50	50	100
20KUG4EA1/ 20KUG4EB1	III	**Open Elective – I**	60	2	4	50	50	100
20KUG4VAD	IV	Value education-Indian Cultural heritage	60	2	4	50	50	100
Sub Total (A)			**180**	**06**	**12**	**150**	**150**	**300**
VOCATIONAL EDUCATION COMPONENT								
20KUP4C06	III	Core VI: Drafting and Plotting	60	2	4	50	50	100
20KUPT4P4	III	Practical IV: Drafting and Plotting	120	3	3	50	50	100
20KUPT4I2	III	Internship Training-II	1200	3	20	100	300	400
Sub Total (B)			**1380**	**08**	**27**	**200**	**400**	**600**
Total (A +B)			**1560**	**14**	**39**	**350**	**550**	**900**

SEMESTER – V

Course code	Part	Course Title	Lecture/ Practical Hrs	Exam Hrs	Credits	Marks		
						Int	Ext	Total
GENERAL EDUCATION COMPONENT								
20KUG5EA2/ 20KUG5EB2	II	**Open Elective – II**	60	2	4	50	50	100
20KUG5AL4	III	Allied IV: Mathematics – III	60	2	4	50	50	100
20KUP5C07	III	Core VII: Organizational Behavior	60	2	4	50	50	100
Sub Total (A)			**180**	**06**	**12**	**150**	**150**	**300**
VOCATIONAL EDUCATION COMPONENT								
20KUP5C08	III	Core VIII: Tool Design – I	75	2	5	50	50	100
20KUPT5P5	III	Practical V: Design and Manufacturing	60	3	3	50	50	100
20KUPT6PR	III	Project	75	-	-	-	-	-
Sub Total (B)			**165**	**05**	**08**	**100**	**100**	**200**
Total (A +B)			**345**	**10**	**20**	**250**	**250**	**500**

SEMESTER – VI

Course code	Part	Course Title	Lecture/ Practical Hrs	Exam Hrs	Credits	Marks		
						Int	Ext	Total
GENERAL EDUCATION COMPONENT								
20KUG6EA3/ 20KUG6EB3	III	**Open Elective – III**	60	2	4	50	50	100
20KUP6C09	III	Core IX: Safety Engineering	60	2	4	50	50	100
20KUG6EA4/ 20KUG6EB4	III	**Open Elective – IV**	60	2	4	50	50	100
Sub Total (A)			**180**	**06**	**12**	**150**	**150**	**300**
VOCATIONAL EDUCATION COMPONENT								
20KUP6C10	III	Core X: Tool Design – II	75	2	5	50	50	100
20KUPT6PR	III	Project	165	3	5	50	50	100
20KUPT6I3	III	Internship Training-III	1200	3	20	100	300	400
Sub Total (B)			**1440**	**08**	**30**	**150**	**350**	**600**
Total (A +B)			**1620**	**14**	**42**	**300**	**500**	**900**

COURSE	CREDITS	MARKS
Tamil	8	200
English	12	300
Part III: Core & Elective Allied	152	3600
Environmental Studies	4	100
Value Education	4	100
Total	**180**	**4300**

Open Elective - I

1. Principles of management (20KUG4EA1)
2. Personality Development and Human Behaviour (20KUG4EB1)

Open Elective - II

1. Total Quality Management (20KUG5EA2)
2. Business Organization (20KUG5EB2)

Open Elective - III

1. Professional Ethics and Human values (20KUG6EA3)
2. Indian Values (20KUG6EB3)

Open Elective - IV

1. Entrepreneurship Development (20KUG6EA4)
2. Human Resource Management (20KUG6EB4)

TAMIL-I

Course code	20KUG1TA1	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

நோக்கம்:

1. இக்கால இலக்கியங்களை அறிமுகப்படுத்துதல்
2. புதுக்கவிதை இலக்கணம், வரையறைகளைக் கற்பித்தல்
3. தற்கால புதுக்கவிஞர்களை அடையாளப்படுத்தி, புதுக்கவிதைகளின் போக்குகளை சுட்டிக்காட்டுதல்
4. பயன்பாட்டுடைய தற்காலத் தமிழைக் கற்றல்

மாணவர் பெறும் திறன்:

Course Outcomes (CO)

CO1	பிழையின்றி சுயமாக பேசவும், எழுதவும் பயிற்சி பெறல்	**K3**
CO2	அரசுத் துறை சார்ந்த பணிகளுக்கு (போட்டித் தேர்வு) தயார்படுத்திக்கொள்ளுதல்	**K2 &K3**
CO3	மரபு, புதுக்கவிதைகளை அறிந்துகொள்ளல்	**K2**
CO4	மாணவர்கள் தங்களின் படைப்பாற்றலை வெளிப்படுத்திக்கொள்ளும் வாய்ப்பினை பெறுதல்.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	L	L	L	M	L		L	L	L	M	S
CO2	L	L	L	M	L		L	L	L	M	S
CO3	L	L	L	M	L		L	L	L	M	S
CO4	L	L	L	M	L		L	L	L	M	S

S – Strong; M – Medium; L - Low

அலகு Iமரபுக்கவிதை

1. பாரதியார் - கண்ணன் என் தாய்
2. கண்ணதாசன் - தத்துவப் பாடல்கள் - அவன் தான் இறைவன்
3. பட்டுக்கோட்டை கல்யாணசுந்தரம் - செய்யும் தொழிலே தெய்வம்

அலகு II புதுக்கவிதை - I

1. கவிஞர் வாலி - தூக்கத்தில் ஒரு துவந்த யுத்தம் - (நிஜகோவிந்தம்)
2. வைரமுத்து - அவன் கலைமகளுக்குப் பாடஞ் சொல்லுகிறான் (திருத்தி எழுதிய தீர்ப்புகள்)
3. சௌந்திரா கைலாசம் - தெய்வீகம் - வளம்பெற வரம் தருவாள் (சௌந்திரா கைலாசம் கவிதைகள்)

அலகு III

1. சேதுபதி - இந்திய மாணவர் - (கனவுப்பிரதேசங்களில்)
2. ந. பிச்சமூர்த்தி - அக்னி (பிச்சமூர்த்தி கவிதைகள்)

அலகு IV- பயன்பாட்டுத் தமிழ்

1. விண்ணப்பக் கடிதம் எழுதப் பயிற்சி
2. வல்லினம் மிகும் இடங்கள்
3. வல்லினம் மிகா இடங்கள்
4. பிழை நீக்கி எழுதுதல்

அலகு V இலக்கிய வரலாறு - I

1. சிறுகதையின் இலக்கியத் தோற்றமும் வளர்சியும்
2. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்.

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BASIC ENGLISH

Course code	20KUG1EN1	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical	--	Sem	I

Objectives:

- To enable the student to understand the main aspects of English grammar.
- To make him speak and write correct English without any grammatical error.

Course Outcomes (CO)

CO1	Overcome his mother tongue influence gradually.	**K1& K3**
CO2	Develop confidence to face the competitive exams and interviews.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	L	L	S	L		M	M	L	M	M
CO2	M	M	L	S	M		M	M	S	S	M

S – Strong; M – Medium; L - Low

UNIT-I

Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection

UNIT-II

Verbs and classification: Main Verb, auxiliary verb, transitive verb, intransitive verb and phrasal verb. Tenses: simple present, present continuous, present perfect, present perfect continuous. Past: Simple past, past continuous, past perfect, past perfect continuous. Future: simple future, future continuous, future perfect, future perfect continuous. Voices: Active and Passive voice.

UNIT-III

Infinitives, Participles, Gerunds and Question Tags, WH questions.

UNIT-IV

Sentence construction, types of sentences: Declarative sentence, interrogative sentence, imperative sentence, exclamatory sentence, affirmative and Negative sentences.

UNIT-V

Linkers, Spotting Errors, Concord.

Books for Study:

- V. Syamala , *Effective English Communication for you*- Emerald Publishers – 2nd Edition -2002
- Pillai, Radhakrishna G, *English Grammar and Composition,* Emerald Publishers, Chennai ,2005

Books for Reference:

- N.Krishnasamy –*Creative English for Communication*- Macmillan India Limited, 2000

MATHEMATICS – I

Course code	20KUG1AL1	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical	--	Sem	I

Objectives:

To enhance the fundamental knowledge of the students in basic Mathematics such as

- Set theory
- Sequence and series
- Algebraic equations
- Matrices.

Course Outcomes (CO)

CO1	Analyze Mathematical techniques and applications.	**K4**
CO2	Solve the problems arise in engineering.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	S	M	L	M		S	M	M	L	L
CO2	S	S	S	M	M		S	M	M	L	L

S – Strong; M – Medium; L - Low

UNIT - I

Set and Functions: Introduction – Properties of operations on sets – De Morgan's laws – verification examples – Venn diagrams – formula for $n(AUBUC)$ – Functions.

UNIT – II

Sequences and series of real numbers: Introduction – Sequences – Arithmetic Progression (A.P) – Geometric Progression (G.P) – Series.

UNIT – III

Algebra: Solving Linear Equations – Polynomials – Synthetic division – Greatest Common Divisor (GCD) – Least Common Multiple (LCM) – Rational Expressions – Square root – Quadratic equations.

UNIT – IV

Matrices-I: Introduction – Types of Matrices – Additional and subtraction – Multiplication – Matrix equation.

UNIT – V

Matrices-II: Inverse of a matrix – Rank of a matrix – Solution of simultaneous linear equations.

Books for Study:

- *Basic Mathematics*, Science Series Rupa, Rupa Publications.
- PA. Navnitham, *Business Mathematics and Statistics*, Jai Publishers, 2012.

BASICS OF PRODUCTION ENGINEERING

Subject code	20KUP1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

OBJECTIVES:

- Basic concepts of Production
- Casting Technologies
- Basic measurement and measuring instruments
- Properties of Materials

OUTCOMES:

CO1	Understand the basic concepts of Manufacturing	**K1 & K2**
CO2	Develop the knowledge in various casting technologies, measurement, properties of different materials, metal forming and powder metallurgy.	**K2 &K3**
CO3	Explain principles and process of Forging, Rolling, Extrusion, drawing and designingof die	**K2&K4**
CO4	Acquire an overview of mechanical measurement systems and principle of instruments for motion and dimensionmeasurement.	**K2,K3&K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	S	M	L		S	S	S	L	S
CO4	M	S	S	M	L		S	M	S	L	M

S – Strong; M – Medium; L - Low

Unit I

Introduction: Internal forces, Stresses and strains, Types of stress and strain, Elasticity, Hooke's law, Poisson's ratio, Elastic constants and their relationship. Stress-strain diagram for ductile materials. Definition of creep, fatigue and stress relaxation. Types of materials - Properties of materials : Hardness, ductility, weldability, machinability, elasticity, plasticity, malleability, etc.,

Unit II

Introduction - Casting - Casting types - procedure to make sand mould - types of core making - moulding tools - machine moulding - special moulding processes – CO2 moulding - shell moulding - investment moulding - permanent mould casting - pressure die casting - centrifugal casting - continuous casting - casting defects - Basic steps in the process of metal casting; Patterns: Materials, types and design of Patterns, Pattern, Pattern allowances.

Unit III

Principles and applications of the following processes: Forging - Rolling - Extrusion - Wire drawing and Spinning - Powder metallurgy – Principal steps involved advantages, disadvantages and limitations of powder metallurgy.

Unit IV

Measurement – Types of measurement – Direct and indirect - Linear measurement - Angular measurement - Profile checking - Calipers : Vernier, inside, outside - Gauges : Plug, Ring, Thread, Slip, Feeler, Vernier height gauge, Vernier Depth gauge - Micrometer : Outside, Inside, Depth - Least count.

Unit V

Quality – Visual inspection – Measuring instruments – Types – Error – Calibration – Range – Selection - Measurements – System of measurement – Imperial system – Metric system – Quality standards - Quality control procedures – Inspecting equipments – Inspection – Hazards – Equipments.

REFERENCE:

- Complete casting handbook 1st and 2nd Edition by John Campbell, Aug 2011 and 2015.
- Applied metrology for Manufacturing Engineering by Ammar Grous.
- Engineering Metrology and Instrumentation by R.K.Rajput.
- Materials Science and Engineering by Callister.
- Powder Metallurgy Technology by G S Upadyay.

PRODUCTION TECHNOLOGY - I

Subject code	20KUP1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

OBJECTIVES:

- Safety in working environment
- Fitting and its Types
- Importance of Lathe
- Types and various operations performed in a Lathe
- Safety in Lathe
- Various special attachments in Lathe

OUTCOMES:

CO1	Develop the ideas to do any type of fitting in metal components.	**K1 & K2**
CO2	Gain knowledge to operate a lathe to produce any component.	**K1, K2, K3**
CO3	Understand the importance to work safety in a workshop.	**K1, K2, K3**
CO4	Deliberate features and applications of reciprocating machine tools like shaper, planer andslotting machine	**K1,K2&K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	M	S	S		S	S	S	S	M
CO4	M	M	S	S	L		S	S	M	S	S

S – Strong; M – Medium; L - Low

Unit I

Working safety – Health and safety – environmental and operating conditions – Safety considerations – Personal protective equipment (PPE) – Safety regulations – Tools and equipments – Hand tools – Machine tools - Safety Instructions.

Unit II

Fitting – Types of fitting – Fitting tools – Equipments – Reporting – Preparation of work area – Selection of raw materials – Inspection - Selection of tools and equipments – Work holding devices – Marking – Templates – Transfer / Trace – Hand tools and manually operated machine tools for fitting – Assembling – Inspection.

Unit III

Various operations in fitting – Drilling, Reaming, Boring, Tapping – Assembling equipments – Fasteners – Adhesives – Soldering – Brazing – Dismantling and assembling – Problem solving – Tool and die – Measure – Inspect – Procedure.

Responsibility – Allocation of responsibility – ensure and inspect – Release drawings, machining specifications, process planning, production planning to operators – Selection of tools – Selection of equipments – Selection of materials.

Unit IV

Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools– nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

Unit V

Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments, machining time and power estimation. Capstan and turret lathes- tool layout – automatic lathes: semi automatic – single spindle : Swiss type, automatic screw type – multi spindle.

REFERENCE:

- Fitting and machining by Ron Culley published by TAFE Publications.
- Mechanical Technology Grade 10: Fitting and machining learner book by D Meyer and BH Van Der Westhuizen.
- Fitter trade theory by Balbir Singh.
- The Lathe book : A complete guide to the machine and its accessories by Ernie Conover
- The metal Lathe by David J Gingery

TAMIL-II

Course code	20KUG2TA2	Credits	04	Year	I
No. of Lecture	60	No. of Practical	--	Sem	II

நோக்கம் :

1. பக்தி இலக்கிய அறிமுகம்
2. சைவ, வைணவ பக்திப் பனுவல்கள் அறிமுகம்
3. சிற்றிலக்கிய வகையறிதல்
4. திருமுறைகள், பிரபந்தங்கள் வரலாறு அறிதல்

மாணவர் பெறும் திறன்:

Course Outcomes (CO)

CO1	பக்தி இலக்கிய காலத்தின் சமயம், பண்பாடு, பக்தி நெறி அறிதல்	**K2**
CO2	அரசுப் போட்டித் தேர்வுகளுக்குத் தயார்படுத்திக் கொள்ளுதல்	**K2 &K3**
CO3	பக்தி இலக்கியங்களின் வழி சைவ, வைணவம் தமிழுக்கு செய்த தொண்டினை அறிதல்	**K2**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	L	L	M	L		L	L	L	M	S
CO2	L	L	L	M	L		L	L	L	M	S
CO3	L	L	L	M	L		L	L	L	M	S

S – Strong; M – Medium; L - Low

அலகு I சைவ இலக்கியங்கள்

1. திருஞானசம்பந்தர் - திருநீற்றுப் பதிகம் - (“மந்திரமாவது நீறு …” எனத் தொடங்கும் பதிகம்)
2. திருநாவுக்கரசர் - திருஅங்கமாலை - (“ தலையே நீ வணங்காய்” எனத் தொடங்கும் பதிகம்)

அலகு II வைணவ இலக்கியங்கள்

1. ஆண்டாள் - நாச்சியார் திருமொழி - 6 ஆம் திருமொழி (வாரணமாயிரம் எனத் தொடங்கும் 10 பாடல்கள்)
2. நம்மாழ்வார் - திருவாய் மொழி - (“முனியே நான்முகனே” எனத் தொடங்கும் 10 பாடல்கள்)

அலகு III சிற்றிலக்கியங்கள் - பிற்கால இலக்கியம்

1. குமர குருபரர் - மதுரை மீனாட்சியம்மை பிள்ளைத் தமிழ்
    1. தாலப் பருவம் - (31)
       (“முதுசொற் புலவர் தெளித்த” எனத் தொடங்கும் பாடல்)
    2. அம்புலிப் பருவம் (72)
       (“ஏடகத்தெழுதாத” எனத் தொடங்கும் பாடல்)
2. தாயுமானவர் - எந்நாட்கண்ணி - (தெய்வ வணக்கம் - 11 கண்ணிகள்)

அலகு IV இலக்கிய வரலாறு - II

பன்னிரு திருமுறைகள்

அலகு V இலக்கிய வரலாறு –III

பன்னிரு ஆழ்வார்கள்

PROFESSIONAL ENGLISH

Course code	20KUG2EN2	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

OBJECTIVES:

- Preparing the student to be competent in verbal and non-verbal communicative skills.
- To enable him to overcome his all linguistic barriers systematically.
- To acquire the desirable proficiency in English language.

Course Outcomes (CO)

CO1	Enable to achieve good communication skills.	**K3**
CO2	Enable to face interviews successfully.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	L	L	S	L		M	M	L	M	M
CO2	M	M	L	S	M		M	M	S	S	M

S – Strong; M – Medium;L - Low

UNIT- I

Formal and Informal Communication. Language for debate and discussion, Students' classroom language. Teacher's classroom language.

Situational English: welcome and thankfulness, making an appointment, asking about educational qualifications, at the post office, a customer at a bank, other situational conversations, visiting a doctor, travelling in a bus, hiring a taxi, at the railway station, reservation for air tickets, meeting after long interval, shopping, outing, watching television, looking for a room in a hotel, and going to the theatre.

UNIT –II

Public speaking skills, extempore, group discussion, job interview, mock sessions and current affairs.

UNIT –III

Writing paragraph, writing stories, picture comprehension, note writing, and note making.

UNIT –IV

Drafting an e-mail, report writing, writing letters, application, and resume preparation.

UNIT –V

Life Skills:

a. Career planning
b. Motivation
c. Motivated goal setting
d. Team work skills
e. Time management skills.

Books for Study:

- T.M. Farhathullah: *English Practice Book for Undergraduates*. Emerald Publishers.
- S. Raghavan : *A Textbook for Communication and Life Skills Practical* .Jey Publications.

OFFICE AUTOMATION

Course code	20KUG2AL2	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical	--	Sem	II

Objectives:

- To develop the basic computer operating skill of the student
- To enable the students to create and maintain their records in computer.
- To create the knowledge for accessing Internet.

Course Outcomes (CO)

CO1	Create basic knowledge for using computer in all fields.	**K1**
CO2	Develop their presentation skills through accessing internet.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	L	M		M	S	S	L	L
CO2	M	M	M	L	M		M	S	S	L	L

S – Strong; M – Medium; L - Low

UNIT-I

BASIC COMPUTER SKILLS: Identifying Major Computer Components - How Computers Work - Turning on the Computer and Logging On - OPERATING SYSTEMS AND SOFTWARE – INTERNET.

UNIT-II

WORD: Introduction to Word Processing: Basic features – Full-Featured word processors – starting word – menus and toolbars – creating, editing and saving a word document – using word help – opening a document – moving multiple text selections simultaneously – link documents – creating table – working with graphics – mail merging – previewing and printing document.

UNIT-III

EXCEL: electronic spreadsheets – spreadsheet packages – starting excel – navigating in a workbook – create, name and save a new workbook – data entry-manual and automatic – correcting mistakes-spelling checker, undo and redo changes.

UNIT-IV

POWERPOINT: Presentation basics – presentation packages – starting PowerPoint – menus and toolbars – opening and saving an existing presentation – presentation using auto content wizard – presentation using design template – creating and saving a presentation using blank presentation.

UNIT-V

MS ACCESS: Use of MS Access – Controls – Customization – database design – filtering and sorting - conversation – database basics – import and export – forms – reports.

Books for Study:

- Alexis Leon, Mathews Leon, ***Introduction to Computers with MS-Office*****,** Tata McGraw Hill Publication, 2003.
- Archana Kumar, *Computer Basics with Office Automation***,** Dreamtech press, 2019.

Books for Reference:

- Dr. R. Deepalakshmi, *Computer Fundamentals and Office Automation***,** Charulatha publications Pvt. Ltd., First Edition,2019.

PRODUCTION TECHNOLOGY - II

Subject code	20KUP2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

OBJECTIVES:

- Various machineries used in production.
- Various types of milling and grinding machines.
- Importance of special machines in production.

OUTCOMES:

CO1	Gain knowledge to operate all the special machines used in production.	**K1 , K2, K3**
CO2	Understand concepts of machining for selection of appropriate machining parameters, and cutting tools for Milling Machine.	**K1, K2, K3**
CO3	Gain the knowledge to utilize the tools of grinding wheels.	**K1, K2, K3**
CO4	Exhibit operation such as Turning, Facing, Threading, Knurling and Grooving onCentre Lathe.	**K1, K2, K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	M	S	S	M	L		S	S	S	M	L
CO4	M	S	M	M	L		S	S	M	S	S

S – Strong; M – Medium; L - Low

Unit I

Milling – Types of milling – Milling machine – Types – Constructional features – Main parts – Working principle – Inspection of machine – Cutters – Types – Work holding devices – Cutter holding devices – Flexibility of machine – Various operations – Gear cutting – Indexing head - indexing mechanism - Cutter - Types of cutter - Selection of cutter.

Unit II

Abrasive processes: grinding wheel – specifications and selection, types of grinding process– cylindrical grinding, surface grinding, centreless grinding and internal grinding - Typical applications - Grinding wheel – Designation – Preparation – Abrasives and types.

Unit III

Bond - Types of bonds – Materials – Preparation – Types – Various operations – Mounting of grinding wheels – Steps in mounting - Safety considerations – Speed – Feed – Depth of cut – Surface finish – Factors affecting surface finish - Dressing and truing of wheels – Cutter – Diamond cutter.

Unit IV

Work holding devices – Selection – Set – Mark – Prepare the work – Selection of tool – Stone – Wheel – File – Abrasives – Specification of grinding wheel – Factors considered for selection – Bond – Types – Wheel types – Cut-off discs (Diamond blade) – Abrasive grinding discs – Grinding stones – Wire brush wheels.

Unit V

Control setting – Work handling – Grinding machine – Types – Angle grinders – Bench grinders – Straight grinders – Rotary die grinders – Disc grinder – Electronic grinder – Electric grinder – Hydraulic grinder – Pneumatic grinder – Pedestal grinder – Cylindrical grinder – Inspection – Surface finish – Geometric dimensions – Common surface imperfections – Errors – Texture – Roughness – Secure tools and equipments – Repairing – Maintenance – Types – Documentation – Job card – Progress reports – Incident reports – Support – Monitor.

REFERENCE:

- Machinist handbook for the apprentice by David B Smith
- Fundamentals of Machining processes : Conventional and Nonconventional Processes by Hassan Abdel - Gawad Ei-Hofy.
- Milling - A complete course by Harold Hall
- Grinding Technology 2nd Edition by Stephen Malkin and Changsheng guo, May 2007.
- Handbook of machining with grinding wheels by by Ioan D. Marinescu, Mike P. Hitchiner, Eckart Uhlmann, W. Brian Rowe.

PRACTICAL -PRODUCTION TECHNOLOGY - I

Subject code	20KUPT2P1	Credits	02	Year	I
No. of Lecture Hours	--	No. of Practical Hours	60	Sem	II

OBJECTIVES:

- To introduce different machining process and machine tool to develop components.

OUTCOMES:

CO1	Create the new ideas and knowledge about fitting and lathe.	**K1& K2**
CO2	Identify the appropriate production process and machines.	**K1 & K2**
CO3	Explicate the working principle of various machines used in manufacturing.	**K2,K3&K4**
CO4	Understand the methods of various methods of operations in fitting and lathe.	**K1, K2&K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	M	S	S	S	M		S	S	S	S	M
CO4	M	S	M	S	M		S	S	S	S	M

S – Strong; M – Medium; L - Low

FITTING:

1. Square filing
2. Profile cutting
3. T - Matting
4. V - Matting
5. Slide fit assembly
6. Drilling, Tapping and fitting

LATHE:

1. Study of Latheand its main parts
2. Facing
3. Straight turning
4. Step turning
5. Chamfering
6. Taper turning
7. Drilling and Boring

8. Thread cutting
9. Knurling

PRACTICAL - PRODUCTION TECHNOLOGY - II

Subject code	20KUPT2P2	Credits	02	Year	I
No. of Lecture Hours	--	No. of Practical Hours	60	Sem	II

Objectives:

- To get hands on experience in Special machines

OUTCOMES:

CO1	Create the new ideas and knowledge about milling machines.	**K1 & K2**
CO2	Expose the safety aspects with respect to man, machine and tools.	**K1 & K2**
CO3	Understand the methods of various methods of operations in milling machines.	**K2, K3**
CO4	Perform finishing operation on flat surfaces using surface grinding machine and Cylindricalgrinding attachment.	**K2, K3& K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	S	S	L		S	S	S	M	M
CO4	S	S	S	S	M		S	S	S	M	M

S – Strong; M – Medium; L - Low

1. Six side milling
2. Step milling
3. Groove milling
4. Gear Cutting
5. Surface Grinding
6. Cylindrical Grinding
7. PCD Drilling

INTERNSHIP TRAINING-I

Subject code	20KUPT2I1	Credits	20	Year	I
No. of Lecture Hours	--	No. of Practical Hours	1200	Sem	II

OBJECTIVES:

- To Understand quality and safety standards as per company's norms
- To gain practical knowledge
- To develop Self confidence
- To develop a good relationship with their co-workers.

OUTCOMES:

CO1	Exposed to an organization overview.	**K1, K2**
CO2	Develop the knowledge in various casting technologies, measurement, properties of different materials, metal forming and powder metallurgy.-	**K2, K3**
CO3	Get awareness about general safety requirements in the industry.	**K2 & K3**
CO4	Understand the rules and regulations of Industry.	**K1,K2 & K3**
CO5	Handling of Equipments, Tools and instruments used in industry.	**K1,K2,K3**
CO6	Practical exposure to handle abnormal & unusual conditions in industry.	**K1,K2&K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	M	S	S		S	S	S	S	M
CO4	S	S	M	S	M		S	S	S	S	M
CO5	S	S	M	S	M		S	S	S	S	M
CO6	S	S	M	S	M		S	S	S	S	M

S – Strong; M – Medium; L - Low

Students should undergo internship training in an esteemed Tool and Die making concern to gain hands on practice and practical industrial exposure.

Students are expected to submit their daily work report at the time of examination.

TECHNICAL COMMUNICATION

Course code	20KUG3EN3	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	III

Objectives:

- To make him acquire the language skills (Listening, Speaking, Reading and Writing) in English.
- To make him require group discussion and public speaking skills.

Course Outcomes (CO)

CO1	Overcome inhibition in speaking in a forum.	**K3**
CO2	Enable to face the day to day life and official requirements.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	L	L	S	L		M	M	L	M	M
CO2	M	M	L	S	M		M	M	S	S	M

S – Strong; M – Medium; L - Low

UNIT-I (LISTENING)

1) Types of Listening
2) Implications of effective Listening

UNIT-II (SPEAKING)

1) Speaker, speech planning process.
2) Speech making process and speech effectiveness
3) Group Communication

UNIT-III (READING)

1) Reading Comprehension.
2) Improving comprehension skills
3) Techniques for good comprehension.

UNIT-IV (WRITING)

1) Sentence Construction
2) Techniques for Paragraph Development
3) Story Writing, Precis Writing

UNIT-V

1) Curriculum Vitae
2) Agenda, Minutes, Notices
3) Memo

Books for Study:

- Sangeeth Sharma & Meenakshi Raman, *Technical Communication Principles and Practice, O*xford, Second edition, 2011
- Rudolph. F. Verderber, Kathaleen S. Verderber , *The Challenge of Effective Speaking*, Thomas Wadsworth,14th edition, 2008

Books for Reference:

- V. Syamala , *Effective English Communication for you*- Emerald Publishers – 2nd Edition -2002

MATHEMATICS – II

Course code	20KUG3AL3	Credits	4	Year	II
No. of Lecture	60	No. of Practical	-	Sem	III

Objectives:

- To gain the basic knowledge about the Interest rate, solution of linear equations, differential and integral calculus.
- To provide the basic knowledge in trigonometry.

Course Outcomes (CO)

CO1	Apply the basic Mathematical calculations in business problems.	**K3**
CO2	Understand the concepts of trigonometric functions.	**K2**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	L	L	S	L		S	M	M	L	L
CO2	M	M	L	S	M		S	M	S	L	L

S – Strong; M – Medium; L - Low

Unit I:

Simple and Compound Interest – Discounting of Bills – True Discount – Banker's Gain.

Unit II:

Variables, Constants and Functions - Limits of Algebraic functions – Simple Differentiation of Algebraic functions – Meaning of Derivative – Evaluation of first and second order derivatives

Unit III:

Elementary Integral Calculus – Determining indefinite and definite integral of simple functions – Integration by parts

Unit - IV

Expansions of $cosn\theta, sinn\theta$ and $tann\theta$ - Expansion of s□□□ and c□□□ in a series of ascending powers of □.

Unit - V

Hyperbolic functions - Relation between Hyperbolic functions - Inverse Hyperbolic functions - Real and Imaginary parts - Logarithm of complex numbers.

Books for Study:

- PA. Navnitham, *Business Mathematics and Statistics*, Jai Publishers, 2012.
- S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy, S.Viswanathan, *Ancillary Mathematics* (Volume I), Printers & Publishers Pvt Ltd., 2007.

Books for Reference:

- G.C.Sharma, Madhu Jain, *Algebra and Trigonometry*, Galgotia Publications Pvt Ltd, First Edition, 2003.

ENVIRONMENTAL STUDIES

Course code	20KUG3ENS	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical	--	Sem	III

Objectives:

- To create the awareness among students regarding Environment.
- To understand the causes of pollution and prevention methods

Course Outcomes (CO)

CO1	Got awareness about the environment.	**K1 &K2**
CO2	Understand the need to protect our environment from pollution and develop the unpolluted society.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	M	L	M	L		L	M	M	M	S
CO2	M	M	L	M	L		L	M	M	M	S

S – Strong; M – Medium; L - Low

UNIT-I

The Multidisciplinary nature of environmental studies-Definition, scope and importance. Need for public awareness-Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effective on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts, over water, dams benefits and problems.

UNIT-II

Ecosystems-Concept of an ecosystem.-Structure and function of an ecosystem.-Producers, consumers and decomposers.-Energy flow in the ecosystem.-Ecological succession.-Food chains, food webs and ecological pyramids.

UNIT-III

Biodiversity and its conservation-Introduction – Definition: genetic, species and ecosystem diversity.- Biogeographically classification of India-Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.- Biodiversity at global, National and local levels-India as a mega-diversity nation-Hot-spots of biodiversity-Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts.-Endangered and endemic species of India-Conversation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-IV

Environment Pollution: Causes, effects and control measures of: Air pollution-Water pollution-Soil pollution-Marine pollution-Noise pollution-Thermal pollution-Nuclear hazards.

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.

UNIT-V

Social Issues and the environment.-From Unsustainable to Sustainable development-Urban problems related to energy-Water conservation, rain water harvesting watershed management.-Resettlement and rehabilitation of people; its problems and concerns.

Case studies: Environment ethics: Issues and possible solutions.

Books for Study:

- *ENVIRONMENTAL STUDIES* – **Publication:** Published by Bharathiar University.

Books for Reference:

- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. *Environmental Encyclopedia*, Jaico Publ. House, Mumabai, 2001
- Agarwal, K.C., *Environmental Biology*, Nidi Publ. Ltd. Bikaner, 2001.

ADVANCED PRODUCTION TECHNOLOGY

Subject code	20KUP3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

OBJECTIVES:

- Understand concepts of Computer Numerical Control.
- Fundamentals of CNC, EDM, IM and AM.
- Understand the conventional and unconventional machining processes.
- Importance of CNC, EDM, IM and AM.

OUTCOMES:

CO1	Recognize commonly used terminology and componentry utilized in injection molding.	**K1,K2&K4**
CO2	Develop knowledge to operate CNC machines, EDM and IM machines.	**K1,K2&K3**
CO3	Learning a part program for any component and setting up in machines.	**K1,K2, K3&K4**
CO4	Understand and find the ideas to select the AM process for a particular job.	**K1,K2&K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1											
CO2	M	S	M	S	M		S	M	M	M	L
CO3	S	S	S	S	M		S	S	S	S	M
CO4	S	S	M	S	S		S	S	S	S	M

S – Strong; M – Medium; L - Low

Unit - I

Types of plastics - Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Working principles and typical applications of Injection moulding – Plunger and screw machines – Blow moulding – Rotational moulding – Film blowing – Extrusion - Typical industrial applications – Processing of Thermosets – Working principles and typical applications - Compression moulding – Transfer moulding.

Unit II

Principle and working and applications of unconventional machining processes such as Electric Dischargemachining (EDM), Electro- Chemical machining (ECM), Ultrasonic Machining (USM), and Abrasive Jet machining (AJM)

Unit III

Introduction - Co-ordinate positioning (Absolute, Incremental), use of sub routines, macros and canned cycles- CAD/CAM CNC Program – Tooling and work holding devices – Symbols used in program – Address characters function – G codes and M codes- identify different parts of the CNC turning machine - Carry out setting for CNC turning center – Set up of machine – Perform the necessary checks before allowing the machine to operation in full program run mode – Checks – Measure all dimension as per specification – Basic maintenance activities.

Unit - IV

CNC machines – 2 axis CNC m/c – 3 axis m/c centre (VMC,HMC) terms in programming – Checks – CNC Programming operation – Preparing, Loading, storing in appropriate format providing part program, trial runs – Simulation [Command and format] – Reference position – Cutter radius offset – Tool length offset] – Cutter compensation function.

Turning operations : straight turning, taper turning, facing, grooving, parting off, thread cutting, drilling, reaming, boring, etc.,

Milling operations: e.g. milling of flat services; gang and straddle milling; milling of sunk and recessed surfaces, face milling, side milling, angular milling, slotting, slitting, key way cutting, face slot cutting, woodruff cutting, dovetail cutting, etc.

Unit - V

Overview – Need - Development of Additive Manufacturing Technology -Principle – AM Process Chain- Classification –Rapid Prototyping- Rapid Tooling – Rapid Manufacturing – Applications- Benefits – Case studies - Basics of Photo polymerization - Powder Bed Fusion - Extrusion Based System - Sheet Lamination Process - Droplet formation technologies - Three Dimensional Printing - Beam Deposition Process.

REFERENCE:

- Injection Molding Reference Guide by Jay.W.Carender
- CNC Machines by B.S.Pabla and M.Adithan : New age international publishers
- CNC Programming handbook by Peter Smid
- EDM handbook by E.Bud Guitrau
- Electrical Discharge Machining by Dr M P Jahan
- Tom Page “Design for Additive Manufacturing” LAP Lambert Academic Publishing, 2012.
- Andreas Gebhardt “Understanding Additive Manufacturing: Rapid Prototyping, Rapid Manufacturing” Hanser Gardner Publication 2011.

PRACTICAL - ADVANCED PRODUCTION TECHNOLOGY

Subject code	20KUPT3P3	Credits	03	Year	II
No. of Lecture Hours	--	No. of Practical Hours	60	Sem	III

OBJECTIVES:

- To Study and practice the various operations that can be performed in lathe, drilling, milling machines and EDM etc. and to equip with the practical knowledge required in the core industries.

OUTCOMES:

CO1	Create the new ideas and knowledge about CNC EDM machines.	**K1,K2,K3&K4**
CO2	Understand the methods of various methods of operations in CNC machines.	**K1,K2, K3&K4**
CO3	Develop new ideas and knowledge about EDM machines.	**K1,K2, K3&K4**
CO4	Fathom various methods of operations in EDM machines.	**K1,K2, K3&K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	S	S	M		S	S	S	S	M
CO4	S	S	S	S	M		S	S	S	S	M

S – Strong; M – Medium; L - Low

1. Plain turning and facing
2. Step turning
3. Thread cutting
4. Turning and facing cycles
5. Face milling
6. Drilling and Boring
7. Profile milling
8. Study of EDM Machines
9. Setting of Work in EDM
10. Profile cutting in EDM
11. Study of 3D Printer

TECHNICAL DRAWING

Course code	20KUP4C05	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Objectives:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

Course Outcomes (CO)

CO1	Apply the Skill in the Geometric construction.	**K3**
CO2	Understand and Develop the Orthographic and Isometric projections.	**K2 &K3**
CO3	Remember the symbols widely used in Electrical and Electronics circuits.	**K1**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	S	M	L	M		M	S	M	L	L
CO2	M	S	M	L	M		M	S	M	L	L
CO3	S	S	M	L	S		M	S	M	L	L

S – Strong; M – Medium; L - Low

Unit I - Geometrical construction

Triangle (Equilateral triangle, Right angle triangle, Isosceles triangle, Acute triangle) - Rectangle, Rhombus, Trapezium, Circles -Regular Polygons (Square, Pentagon, Hexagon, Heptagon, Octagon)-Parabola (Tangent method, Offset method)-Ellipse (Parallelogram method, Four centre method, Concentric circles method)-Hyperbola-Cycloids -Involutes -Helix -Spiral curves.

Unit II-Projections

Orthographic (first angle and third angle) (10 simple exercises each) - Isometric (5 simple exercises) - Oblique (2D and 3D wire frame models) (3 simple exercises) - Blue print reading (Missing views - Missing Lines - Missing dimensions)

Unit III- Sectional View

Types of sectional view (Full section, Half section, Aligned section, Offset Section, Revolved Section, Removed section) - Detailing view.

Unit IV -Electrical and Electronics Symbols

Symbols of – DC armatures – alternators – field winding shunt, series and compound – relays – contactors – fuses – main switch – electric bell – earth – aerial – DPST – DPDT – TPST – Network link – ammeters – voltmeters – wattmeter – energy meters – frequency meters – power factor meters – timers – buzzers – transformers – auto transformers- Incandescent lamp- Fluorescent Lamp -Signal lamp- Push button- Fire alarm – Siren- Water Heater- Ceiling Fan- Exhaust Fan –

Resistors – inductors – capacitors - diodes – transistors – FET – SCR – UJT – DIAC – TRIAC – MOSFET'S - LOGIC GATES – AND – OR – NOT – NAND – NOR – EXOR

Unit V- Introduction to AutoCAD

History of AutoCAD-Applications- Advantages over manual drafting - hardware requirements – software requirements – window desktop – AutoCAD screen interface – menus – toolbars - How to start AutoCAD – command groups – How to execute command – types of coordinate systems – absolute-relative-polar- Simple sketches (lines and curves)

Books for Study:

- Gopalakrishnan K.R., "Engineering Drawing" (Vol I & II combined), Subhas stores, Bangalore, 27th Edition, 2017
- Shah M.B., and Rana.B.C., " Engineering Drawing", Pearson, 2nd edition, 2009.

Books for Reference:

- Venugopal.K, *Engineering Drawing and Graphics,* New age International Publishers, 5th Edition, 2004
- N.D.Bhatt, *Engineering Drawing,* Charotar Publication,2014

Open Elective - I

1. **Principles of management**
2. **Personality Development and Human Behaviour**

Open Elective I- PRINCIPLES OF MANAGEMENT

Course code	20KUG4EA1	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Objectives:

- Study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

Course Outcomes (CO)

CO1	Understand the basic managerial functions of an organization	**K1**
CO2	Develop the leadership qualities and planning attitude	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	L	L	S	M		L	M	M	S	S
CO2	M	M	M	S	M		L	S	S	S	S

S – Strong; M – Medium; L - Low

UNIT I: INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

Definition of Management – Science or Art – Manager – managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises –Current trends and issues in Management.

UNITII: PLANNING

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning Tools and Techniques – Decision making steps and process.

UNIT III: ORGANISING

Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management.

UNIT IV: DIRECTING

Meaning, Principles and Functions- Motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V: CONTROLLING

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – direct and preventive control – reporting.

Books for Study:

- Stephen P. Robbins & Mary Coulter, " *Management*", Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
- JAF Stoner, Freeman R.E and Daniel R Gilbert "*Management*", Pearson Education, 6th Edition, 2004.

Books for Reference:

- Parag Diwan, *Management Principles and Practices,* Excel Books, first edition, 2002
- Prasad L M , *PRINCIPLES AND PRACTICE OF MANAGEMENT,* Sultan Chand & Sons-New Delhi, first edition, 2019

Open Elective I - PERSONALITY DEVELOPMENT AND HUMAN BEHAVIOUR

Course code	20KUG4EB1	Credits	4	Year	III
No. of Lecture	60	No. of Practical	-	Sem	VI

Objectives:

- To update the knowledge of schools of psychology and recent trends of psychology.
- To be familiarized with the developmental changes in various development stages across the life span.
- To equip the knowledge of personality, intelligence, motivation, perception, learning and attitude.
- To understand the importance of developmental stages of psychology and Health Psychology in social work practice and be able to know the real life situations.

Course Outcomes (CO)

CO1	Enhance the knowledge in the field of psychology.	**K1 &K2**
CO2	Importance of personality, intelligence, motivation, perception, learning and attitude in day to day life.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	L	L	S	M		L	S	M	S	S
CO2	L	L	L	S	M		L	S	M	S	S

S – Strong; M – Medium; L - Low

UNIT – I

Psychology: Definition - **Schools of Psychology:** Structuralism, Functionalism and Gestalt - **Recent trends:** Biological, Psychodynamics, Cognitive, Behavioural, Humanistic – Branches of psychology, Application of Psychology in Social Work.

UNIT – II

Evolution of human life: Conception – Stages of Prenatal development a) Period of Ovum, b) Period of embryo, c) Period of Fetus – Birth and its types - Pre and Post natal care **Human growth and development**: Developmental tasks, Hazardous, Physical, Social, Emotional and Cognitive development of Infancy, Babyhood, Childhood, Puberty, Adolescence, Adult, Middle age, Old age (Applicable wherever relevant).

UNIT – III

Personality: Definition and Characteristics - **Major approaches to personality:** Trait, Learning, Biological, Humanistic, Freudian and Neo Freudian - Assessment of personality - Influence of Heredity and Environment in one's personality development

Intelligence: Definition - **Theories of intelligence:** Unitary, Multi-faction, Two factor, Group factor, Hierarchical – Types of intelligence **-** Measurement of intelligence – Classification of I.Q – Mentally retarded – Gifted - **Motivation**: Definition, Human needs and motivation – Interaction of motivation – **Theories of motivation:** Instinct, Drive reduction, Arousal, Incentive, Cognitive, Maslow's Hierarchy.

UNIT – IV

Perception: Definition, Characteristics, Perceptual processes, Factors influencing perception, Depth perception and Motion perception, Perceptual illusion, Subliminal perception and Extra sensory perception - **Learning**: Concept and **types of learning:** Cognitive, Sensory, Motion and Verbal learning – **Theories:** Trial and error, Classical conditioning, Operant conditioning, Insightful – Transfer of learning - **Attitude:** Definition, Nature, Components of attitude and their Consistency, Prejudice, Process of attitude change.

UNIT – V

Health Psychology: Stress, Factors influencing stress, Stress reduction strategies (Coping, relaxation, Meditation, Group, Music, exercise and relationship therapies) – Defense mechanisms – A brief idea on major psychiatric illness – Significance of mental health – Role of social workers in promoting mental health.

Books for Study:

- Feldman Robert. S, Understanding *Psychology*, New Delhi: Tata Mc Graw Hill, 6th edition, 2004.
- Mangal. S.K.*General Psychology*. New Delhi: Sterling Publishers Pvt.Ltd
- Pathak Shalini, *Human Development*. New Delh:,Sonali Publications,2007.

Books for Reference:

- Pankajam. G,*Know your Child*. New Delhi: Concept publishing Co, 2005.
- Sharma. K.K, *Principles of Developmental Psychology*. Jaipur, Sublime Publications, 2003.

DRAFTING AND PLOTTING

Subject code	20KUP4C06	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

OBJECTIVES:

- To understand the need of Drafting and plotting
- To understand the design requirements
- To create and modify the design

OUTCOMES:

CO1	Developing the knowledge to create and edit the designs.	**K1 & K2**
CO2	Appreciate the standard drawing codes and practices which is required for producing engineering drawings.	**K1K2,K3&K4**
CO3	Understand the concepts of design outputs.	**K2, K3&K4**
CO4	Relate AutoCAD knowledge to current applications used in the modern world.	**K2,K3&K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	M	S	S	S	L		S	S	M	M	S
CO4	S	S	S	S	L		S	S	M	M	S

S – Strong; M – Medium; L - Low

UNIT - I

Intro of CAD - CAD Workspaces - Using The Application Menu, Ribbon And The QAT-Command Line, Dynamic Input And Auto Complete- Toolbars, File Tabs And The Menubar-Pallets And Short Cut Menus-Using Function Keys And Command Aliases- The Status Bar-An Introduction To Model Space And Paper Space- Quick Access the Drawings

UNIT - II

Start and Quitting CAD-Object Selection Methods, Undo Command- Working With Specific Units- Working With The Coordinate System- Using The Grid System With The Snap Feature-Pan , Zoom, Osnap,Ortho and Grips- Project related to until this Chapter

UNIT – III

Lines, Polylines And Their Uses-Arcs, Circles and its types-Points And Their Styles- Polygons , Rectangles And Ellipses- Methods To Create Precise Objects- Project related to until this Chapter

Trim And Extend Lines- Delete, Trim And Extend Lines- The Move And Copy Commands- Stretching, Rotating and Scaling Objects- Offset and Mirror- Fillet And Chamfer- Types of Arrays and Object Properties- Project related to until this Chapter

UNIT – IV

Creating and Editing Layers- Layer Properties and Manager- Freeze, Thaw, On, Off, And Lock Dimensions and its Styles- Dimensioning Tools And Settings- Multileaders- Single and Multiline Text- Text Styles and Tables- Chapter Project

UNIT – V

Intro about Blocks and its uses - Creating Blocks and Editing Blocks- Inserting Blocks And Using Them- Attributed and Dynamic Blocks- The Effect Of Exploding Blocks- Chapter Project The Difference between Model Space And Paper Space-Viewports , Page Setup and Plotting- Export Your File

REFERENCE:

- A text book of Engineering drawing by Roop Lal and Ramakant Rana
- Engineering graphics with Autocad by D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar

PRACTICAL - DRAFTING AND PLOTTING

Subject code	20KUPT4P4	Credits	03	Year	II
No. of Lecture Hours	--	No. of Practical	60	Sem	IV

OBJECTIVES:

- To develop skill to use software to create 2D and 3D models.

OUTCOMES:

CO1	Create the new ideas and knowledge about AutoCAD software's.	**K1 & K2**
CO2	Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings	**K1 ,K2& K3**
CO3	Able to draw Ellipse, Parabola, Hyperbola & Cycloid drawing.	**K1 ,K2& K3**
CO4	Understand the methods of various methods and commends in AutoCAD software's.	**K2, K3&K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	M	S
CO3	M	S	S	S	L		M	S	S	M	S
CO4	M	S	S	S	L		M	S	S	M	S

S – Strong; M – Medium; L - Low

1. Introduction to Auto Cad
2. Tool bars and Menu bars
3. Create simple Engineering drawings (Ellipse, Parabola, Hyperbola, Cycloid, Involute)
4. Create simple mechanical designs

INTERNSHIP TRAINING-II

Subject code	20KUPT4I2	Credits	20	Year	II
No. of Lecture Hours	--	No. of Practical Hours	1400	Sem	IV

OBJECTIVES:

- To obtain hands on training of CNC machines and EDM.
- To Coordinate with the design team
- To develop a good relationship with their co-workers

OUTCOMES:

CO1	Developing the planning approach to prepare programme in CNC Machine	**K1 & K2**
CO2	Prepare and Coordinate the plan of Machine.	**K2, K3&K4**
CO3	Gain self-confidence and able to co-ordinate with others.	**K2, K3&K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	M	S	S		S	S	S	S	M

S – Strong; M – Medium; L - Low

Students should undergo internship training in an esteemed Tool and Die making concern to gain hands on practice and practical industrial exposure.

Students are expected to submit their daily work report at the time of examination.

Open Elective II

1. **TOTAL QUALITY MANAGEMENT**
2. **BUSINESS ORGANIZATION**

Open Elective II- TOTAL QUALITY MANAGEMENT

Course code	20KUG5EA2	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Objectives:

- To facilitate the understanding of Quality Management principles and process.

Course Outcomes (CO)

CO1	Gain the knowledge of Quality management principles and Techniques.	**K1**
CO2	Understand the importance of the Quality and apply in industry.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	M	L	S	S		L	M	M	S	S
CO2	L	M	L	S	S		L	M	M	S	S

S – Strong; M – Medium; L - Low

Unit - I INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

Unit - II TQM PRINCIPLES

Leadership- Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDSAcycle, 5s, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

Unit - III TQM TOOLS & TECHNIQUES I

The seven traditional tools of quality - New management tools - Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT

Unit - IV TQM TOOLS & TECHNIQUES II

Control Charts - Process Capability - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

Unit - V QUALITYSYSTEMS

Need for ISO 9000 - ISO 9001:2015, ISO 29990:2010 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

Books for Study:

- Dale H.Besterfiled, et at., "*Total Quality Management*", Pearson Education Asia, Third Edition, Indian Reprint (2006).
- Janakiraman,B and Gopal, R.K, "*Total Quality Management - Text and Cases*", Prentice Hall (India) Pvt. L, First Edition, 2006

Books for Reference:

- William M. Lindsay, James R. Evans , "*The Management and Control of Quality*",South Western College Publication; 6th edition, 2005.
- John S Oakland, "*TQM: Text with Cases*", A Butterworth-Heinemann Title; 3rd edition, 2003.

E-Resource:

http://www.uop.edu.pk/ocontents/Total%20Quality%20Management%20by%20Dale%20H.%20Besterfield,%20Carol%20BesterfieldMichna,%20Glen%20H.%20Besterfield,%20Mary%20BesterfieldSacre,%20Hemant%20Urdhwareshe,%20Rashmi%20Urdhwarshe%20(z-lib.org).pdf

Open Elective II- BUSINESS ORGANIZATION

Course code	20KUG5EB2	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Objectives:

- To understand the different types of business organizations.
- To understand the process of formation of business organization.

Course Outcomes (CO)

CO1	Understand the concept of business.	**K2**
CO2	Gain knowledge to start and run a business effectively in the modern society.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	L	M	L	S	S		L	M	M	S	S
CO2	L	M	L	S	S		L	M	M	S	S

S – Strong; M – Medium; L - Low

Unit-I

Business: Concept- Objectives - Characteristics - Types and Qualities of a good Businessman. Business Organization**:** Concept- Characteristics of an ideal form of Business organization.

Unit-II

Forms of Business Organisation : Sole Trader, Partnership, Joint Stock Companies, Cooperative Organisation and Public Utilities - Merits and Demerits - Memorandum of Association and Articles of Association.

Unit-III

Company Management-Shareholders: Powers, Duties, Responsibilities and Functions-Composition of Board- Board of Directors: Functions -Chief Executive-Managing Director- Legal Restrictions-Provisions in the Companies Act.

Unit-IV

Methods of raising funds: Need and importance of ST & LT finance - Issue of Shares, issue of Debentures- Public deposits - assistance from Govt. and Industrial Financial Institutions borrowings from banks

Unit-V

Rationalisation: Definition- Objectives - Measures -Advantages-Automation- Business Combination: Concept– objectives - Causes - Types – Forms.

Books for Study:

- Y.K. Bhushan,*Fundamentals of Business organization and Management*, Sultan Chand & Sons, 19th edition, 2013.
- R. C. Bhatia, *Business Organisation and Management*, ANE Books, 2012

Books for Reference:

- P.N.Reddy, Principles of Business Organization and Management, S.Chand (G/L) & Company Ltd, 2010.
- KathiresanRatha, Business Organisation– Prasanna Publications. 2006.

MATHEMATICS – III

Course code	20KUG5AL4	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Objectives:

- To understand the concepts of solving numerical algebraic equations and transcendental equations.
- To use interpolation and numerical differentiation.
- To provide the basic concepts of Measures of central tendencies and dispersion.

Course Outcomes (CO)

CO1	Solve numerical algebraic equation and transcendental equations.	**K2 &K3**
CO2	Able to solve the real world problems.	**K2 &K3**
CO3	Understand Mathematical techniques and applications.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	L	L	L	L		S	M	M	L	L
CO2	M	M	L	L	M		S	M	M	L	L
CO3	M	M	S	L	M		S	M	M	L	L

S – Strong; M – Medium;L - Low

Unit - I

THE SOLUTION OF NUMERICAL, ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Introduction - The Bisection method -Iteration method - The Method of False Position- Newton's Iteration method.

Unit - II

INTERPOLATION: Introduction - Linear Interpolation - Gregory Newton Forward Interpolation Formula - Gregory Newton Backward Interpolation Formula - Equidistant terms with one or more missing values.

Unit - III

NUMERICAL DIFFERENTIATION: Newton's Forward Difference Formula to compute the Derivatives - Newton's Backward Difference Formula to compute the derivatives - Derivatives using Striling's formula.

Unit - IV

MEASURES OF CENTRAL TENDENCIES: Arithmetic Mean, Median and Mode, Geometric mean, Harmonic mean.

Unit - V

MEASURES OF DISPERSION: Range, Mean deviation, Quartile deviation, Standard deviation, Co-efficient of variation.

Books for Study:

- P.Kandasamy, K.Thilakavathy, K.Gunavathy, *Numerical methods,*2003 Edition.
- RSN. Pillai &Bhagavathi, *Statistics*, Sultan Chand Publishers, reprint 2002.

Books for Reference:

- M.K.Venkataraman, *Numerical methods for Science and Engineering,*The National publishing company, Fifth Edition,1999.
- P.Navanitham, *Business Mathematics and statistics*, Jain publishers, 2008

CORE VIII: ORGANIZATIONAL BEHAVIOUR

Course code	20KUP5C07	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical	--	Sem	V

Objectives:

- To develop a sound theoretical knowledge and understanding of organizational behavior.
- To know how the people at work in an organization could be motivated to work together in harmony.
- To orient the student about leadership and perspective of organizational behavior.

Course Outcomes (CO)

CO1	Understand the values and importance to behave in an organization.	**K2**
CO2	Develop the skill of harmony to work together in the organization.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	L	L	L	S	M		L	M	L	S	S
CO2	L	L	L	S	M		L	M	L	S	S

S – Strong; M – Medium; L - Low

UNIT – I

Organizational Behavior: Concept, Historical background, Approaches and Models of OB - Challenges and Opportunities for OB **–Behavioral Science foundation:** Sociology, Psychology & Anthropology.

UNIT – II

Individual Dimension of OB: Personality: Self–esteem, Self-efficacy, perception, values – **Attitude:** Job satisfaction, job involvement, Organizational commitment – **Work Motivation:** Theories (Content, process) – **Job Design:** Job rotation, Job enlargement, Job enrichment– **Learning Theories:** Behaviorist, Cognitive and Social learning, Principles of learning - Punishment & Reinforcement.

UNIT – III

Dynamics of OB: Groups & Teams - Conflict & Negotiation - Stress & Stress management – **Leadership:** Types (Charismatic, Transformational and Substitute), Approaches (Managerial grid approaches, Likert's four system approaches), Skills - Emotional intelligence and managerial test.

UNIT – IV

Perspective of OB: Use and Types of Information Technology in Communication (MIS, Telecommunication, E-mail & Voice messaging) **– Non Verbal Communication:** Body Language & Paralanguage - **Decision making:**Group decision making, Delphi technique, Nominal group technique – Organizational Design **– Organizational culture and climate:** Definition and Characteristics.

UNIT – V

Organizational Change and Development: **Change:**Concept, Planned change, Resistance to change, Merges and Acquisitions - A**nalysis:** Tools, techniques - **Development:** Concept, ESOP (Employee Stock Ownership Plan), Downsizing, Smart sizing

Books for Study:

- Amrik Singh Sudan & Kumar N,*Management Process and Organizational Behaviour,* Anmol Publications, Delhi, 2003.
- Don Hellriegel, John W.Slocum, Richard W.Woodman,*Organizational Behaviour*,South-Western College Publication, 8th Edition, 1997.

Books for Reference:

- Jit S. Chandan, *OrganisationalBehaviour,* Vikas Publishing House, 3rd Edition, 1999
- Mishra M.N, *Organizational Behaviour,* Vikas Publishing House, First Edition, 2001

TOOL DESIGN - I

Subject code	20KUP5C08	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	V

OBJECTIVES :

- Identify the Difference between Jig & Fixtures
- Explain possible freedom of movement of job in a jig, fixtures
- Study locating of work piece in a jig, fixture
- Explain mounting of jig on a machine tool
- Explain mounting of fixtures on the machine tool
- Design jig and fixtures
- Design of plug and snap gauges

OUTCOMES:

CO1	Understand clearly the tool design parameters of Jigs, fixtures and Gauges	**K1 & K2**
CO2	Develop the knowledge to differentiate jig and fixture	**K2 & K3**
CO2	Create ideas to draw the design of jig or fixture for a special purpose	**K2 & K3**
CO3	Understand the different types of Fixtures and Gauges	**K1 & K2**

- K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	M	S	S	M	M		S	S	S	M	M
CO4	M	S	M	S	M		S	M	M	M	L

S – Strong; M – Medium; L - Low

UNIT - I

Introduction – Jigs and Fixtures – Difference between Jigs and Fixtures – Advantages of Jigs and Fixtures – Elements of Jigs and Fixtures – Fool Proofing – Materials used in Jigs and Fixtures – Degrees of Freedom - 12 degrees of freedom – 6 points location principle (or) 3-2-1 principle of location - Essential features of Jigs and Fixtures– General Design Principles – Design steps – Common defects in Jig Design.

UNIT - II

Principles of location – location point – types of locators – pins and studs – V block – cup and cone location points – adjustable locating points – special adjustable stops – location from finished holes in the work – Diamond pin locator – types of clamps – lever clamp – hinged clamp – two way clamp – Swinging clamp – wedge clamp – eccentric clamping arrangement – Quick action clamp – Pneumatic and Hydraulic clamps.

UNIT - III

Materials for Jig bushing – press fit bushings – Fixed renewable bushings – slip renewable bushings – Liner bushings – screw bushings - miscellaneous type of drill bushings – bushing specifications.

Open drill jig – plate drill jig – template drill jig – channel drill jig – turn over drill jig – angle plate drill jig – closed box drill jig – leaf drill jig – Post jig – Pot jig - indexing drill jig – universal drill jig – design of template and leaf jigs.

UNIT - IV

Introduction: principles of fixture design – elements of fixtures – design consideration of locators and clamps for fixtures – types of fixtures – Design of turning fixtures - Mandrels – Type of mandrels - Boring fixtures – Milling fixtures – essentials of milling fixtures - method of locating milling fixtures with respect to cutter position – Grinding fixtures – surface grinding and cylindrical grinding.

UNIT - V

Introduction – limit gauges –Taylor's principle of limit gauging – Application of limit gauges – gauge makers tolerance – allowance for gauge wear – material for limit gauge – three basic types of limit gauges – Disposition of gauge tolerance and wear allowance – plug gauge – snap gauge – ring gauge – thickness and length gauges – recess gauge – step gauge – position and receiver gauges – IS specifications for gauges – Design of plug and Snap gauges.

Text Books:

1. Donoldson.C and Others, "Tool Design", Tata McGraw Hill, 1978

2. Kempster, "Introduction to Tool Design and Jigs and Fixtures", ELBS

Reference Books:

1. ASTME, "Hand book of Fixture Design"

2. Korsakov, "Fundamental of Fixture Design", MIR Publication, Moscow

3. Goroshkin.A.K., "Jigs and Fixtures Handbook", MIR Publication, Moscow

Houghton, "Jigs & Fixture Design

PRACTICAL -DESIGN AND MANUFACTURING

Subject code	20KUPT5P5	Credits	03	Year	III
No. of Lecture Hours	--	No. of Practical Hours	60	Sem	V

OBJECTIVES:

- To make Sketching, Part design, Assembling, Drafting and detailing, Modelling and standards with respect to manufacturing details.
- Creo is equipped with all the capabilities that are required for completing a product design.

OUTCOMES:

CO1	Create the new ideas and knowledge about Creo software.	**K1 & K2**
CO2	Understand the various methods and commends in Creo software's.	**K2, K3 &K4**
CO3	Understand design generative & interactive drafting in Creo software.	**K2, K3 &K4**
CO4	Know the Complete details of Sketching module tools such as lines, Arc, Ellipse, and Polygon etc.	**K2, K3 &K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	M	S	S	M	M		S	M	S	M	L
CO4	S	S	S	S	M		S	S	S	S	M

S – Strong; M – Medium; L - Low

1. Introduction and 2D modelling
2. 3DSolid modelling
3. Surface and Sheet metal modelling
4. Drafting and assembly
5. Manufacturing

Open Elective III

1. **PROFESSIONAL ETHICS AND HUMAN VALUES**
2. **INDIAN VALUES**

Open Elective III - PROFESSIONAL ETHICS AND HUMAN VALUES

Course code	20KUG6EA3	Credits	4	Year	III
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	VI

Objectives:

- To understand what morality is and how it connects to professional ethics.
- To understand the features of moral reasoning, moral explanations and the role of moral theories.
- To develop a case resolution model for resolving moral dilemmas faced by professionals.

Course Outcomes (CO)

CO1	Createawareness of Ethics and moral values.	**K1 &K2**
CO2	Understand the importance of Ethics and code of conduct in business.	**K2 &K3**
CO3	Understand social responsibility in business and importance of human values	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	L	L	S	M		L	L	L	S	S
CO2	L	L	L	S	M		L	L	L	S	S
CO3	L	L	L	S	M		L	L	L	S	S

S – Strong; M – Medium; L - Low

Unit I:Business Ethics

Conceptual approach – Emerging issues – Importance of Ethics – Understanding Ethics – Ethical decision making – Moral problem

Unit II:Managing Ethical Organization

Elements of ethical organization – Manager's role in influencing ethical climate - Codes of ethics – Codes of Contact – Ethical leadership – Ethical organization.

Unit III:Business ethics in Profession

Ethical concern in Human Resource Management (HRM) – Ethical issue in marketing and advertising – Marketing ethics – Ethics in production management – work ethics.

Unit IV:Corporate Governance and social responsibility:

Corporate Governance – Company management – Factors for success – Social responsibility towards stakeholders – Social responsibility of business.

Unit V:Human Values

Wisdom Management – A person of character – Knowledge Management – Understanding success – Stress management

Books for Study:

- R.Subramanian, *Professional Ethics includes Human Values*,Oxford Publication, 2nd edition, 2013.
- M.Govindarajan, S.Natarajan, V.S. Senthilkumar, *Professional Ethics includes Human Values*,PHI Publication, First edition, 2013.

Books for Reference:

- S.K Bhatia, *Business Ethics and Global Values*, Regal Publication, New Delhi, 2008
- Mike W. Martin, *Ethics in Engineering*,McGraw Hill Education, 4th edition, 2017.

Open Elective III - INDIAN VALUES

Course code	20KUG6EB3	Credits	4	Year	III
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Objective:

- To create an awareness of values promoted in the cultural and spiritual heritage of India and to impart means to inculcate these values for one's personal growth and national development.

Course Outcomes (CO)

CO1	Understand the importance of our cultural and spiritual heritage	**K1 &K2**
CO2	Know the life history of national leaders of our Country.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	L	L	S	M		L	L	L	S	S
CO2	L	L	L	S	M		L	L	L	S	S

S – Strong; M – Medium; L - Low

UNIT I- Character formation through Positive personality

Truthfulness, Sacrifice, Sincerity, Self Control, Altruism, Tolerance, Cultivating will-power and character building - Swami Vivekananda's ideas on Personality Development – Strength - Faith in one's self – Self-confidence – Ego, overconfidence and inferiority complex .

UNIT II- Holy Mother Sarada Devi Life

Birth of holy mother- The holy life of Sarada Devi with Bahavan Sri Ramakrishna- Message of Sarada Devi to the world

UNIT III- Yoga's

Introduction to Yoga – Asanas, Pranayama & Meditation – Benefits of Yoga – Four types of Yoga (Karma yoga - Bakthi Yoga- Raja Yoga- Gnana Yoga)- Control of Mind through Yoga & Meditation.

UNIT IV- The inspirational life of Indian leaders

Rabindranath Thagore- Sri. Aurobindo- BalagangatharaThilak- Vinobabave- Nethaji Subash Chandra Bosh- Baghatsingh, Rajaguru, Sukdev- TheeranChinnamalai- Dr. A.P.J. Abdhul Kalam.

UNIT V- Importance days of India

Independence Day -Republic Day- Dandhi Salt March- Jallianwallah Bagh Massacre Day- Sepoy Mutiny- Battle of Plassey- Kargil Victory Day.

Books for Study:

1. Personality development by Swami Vivekananda
2. Holy Mother by Swami Nikhilananda
3. My India, The India Eternal by Swami Vivekananda

SAFETY ENGINEERING

Course code	20KUP6C09	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Objectives:

- To follow standard safety rules and concepts.
- To understand the Safety procedures in material handling.
- To understand the Road and Electrical Safety.

Course Outcomes (CO)

CO1	Understand the importance of safety.	**K2**
CO2	Able to handle the materials and tools safely.	**K2 &K3**
CO3	Follow the road and electrical safety.	**K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	M	M	S	M		M	M	M	S	S
CO2	S	S	S	S	S		S	S	S	S	S
CO3	S	S	S	S	S		S	S	S	S	S

S – Strong; M – Medium; L - Low

Unit-I Introduction

Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee- budgeting for safety - Risk assessment & management - Safety Education and training- Importance, various training methods – First Aid, Resuscitation, Bleeding, management of shock, Burns, scalds and accidents caused by electricity, Rescue and transport of casualty Role of management and role of Govt. in industrial safety, safety analysis.

Unit-II Safety prevention

Definitions and theories, Accident, Injury, unsafe condition, Dangerous occurrence- Cost of accidents- Accident prevention- Safety performance - Personal protective equipment- survey the plant for locations and hazards, part of body to be protected - Economic importance of accidents, Analysis of accident records, accident investigations.

Unit-III Safety in Material Handling

General safety rules, principles, maintenance, Inspections of turning machines, boring machines, milling machine, planning machine and grinding machines, CNC machines, electrical guards, work area, material handling, inspection - Heat treatment operations, paint shops, sand and shot blasting, safety in inspection and testing, pressure vessels, air leak test, steam testing, safety in radiography, personal monitoring devices, radiation hazards.

Unit-IV Shop floor Safety

Automotive vehicle design, selection, operation and maintenance of motor vehicle - Basic automotive road Signals, Symbols, Rules and Regulation - safety on manual, mechanical handling equipment operations - Servicing and maintenance equipment grease rack operation wash rack
operation - battery charging - gasoline handling - other safe practices - preventive maintenance - check lists - motor vehicle insurance and surveys.

Unit-V Electrical Safety

General principles of electric safety - Preventive maintenance - Electricity & Human body - Earthing / Grounding - Safety against over voltage, extra-low and residual voltages - Hazardous areas, Electrical insulation - Energy leakage - Electrical fires and Arc flash - Electrical causes of fire and explosion - National electrical Safety code - Safety in the use of portable tools.

Books for Study:

- C.RayAsfahl ,*Industrial Safety and Health management,* Pearson Prentice Hall, 5th Edition, 2003.
- N.V Krishnan. *Safety Management in Industry* Jaico Publishing House, Bombay, First Edition, 1993.

Books for Reference:

- A.K.Gupta, *IndustrialSafety and Environment*, Lakshmi Publication,Third Edition, 2021.
- Mark A. Friend, James P. Kohn, *Fundamentals of Occupational Safety and Health*, Bernan Press,7th Edition, 2018.

Open Elective IV

1. **ENTREPRENEURSHIP DEVELOPMENT**
2. **HUMAN RESOURCE MANAGEMENT**

Open Elective IV - ENTREPRENEURSHIP DEVELOPMENT

Course code	20KUG6EA4	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Objectives:

- To understand the concept of Entrepreneur and entrepreneurship.
- To gain the knowledge about financial institutions.
- To understand the institutional setup, incentives and subsidies.
- To evaluate business ideas and to prepare the project report.

Course Outcomes (CO)

CO1	Understand concept of finance institutions, project report, incentives and subsidies.	**K2**
CO2	Develop the qualities to become an entrepreneur	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	M	L	S	M		L	M	M	S	S
CO2	M	M	M	S	M		L	M	M	S	S

S – Strong; M – Medium; L - Low

Unit I: Entrepreneurship

Meaning, Definition, Characteristics and Functions-Role of Entrepreneur in economic development -Types-Qualities of an Entrepreneurs - Classification of Entrepreneurs-Factors Influencing Entrepreneurship – Entrepreneurship development programme – Self Employment schemes – Government policies on Entrepreneurial development.

Unit II: Institutional Finance to Entrepreneurs

State Level Financial Institutions: State Financial Corporation (SFCS) - State Industrial Development Corporation (SIDCS) – Tamilnadu Industrial Investment Corporation (TIIC) - Small Industries Promotion Corporation of Tamilnadu (SIPCOT).

All Indian Financial Institutions:

Industrial Development Bank of India (IDBI) – Industrial Finance Corporation of India (IFCI) – Industrial Credit Investment Corporation of India (ICICI) – Industrial Rural Development Bank of India (IRDBI).

Unit III: Institutional Setup to Entrepreneurs

District Industries Centre (DIC) – National Small Industries Corporation (NSIC) – Small Industries Development Corporation (SIDC) – Small Industries Service Institute (SISI) – Indian Investment Centre – Kadhi and Village Industries (KVIC).

Unit IV: Incentives and Subsidies of State and Central Government

Subsidy For Market – Capital Assistance - Subsidized Services – Taxations, Benefits to SSI – Transport Subsidy – Seed Capital Assistance – Special Facilities for imports.

Unit V: Sources of Ideas

Preliminary Evaluation and Testing of ideas – Demand based industries and Resource based industries - Project Formulation - Project Identification-Evaluation-Feasibility Analysis-Project Report.

Books for Study:

- Dr.Gupta C. B, Dr. Srinivasan N.P.,*Entrepreneurship Development*, S. Chand & Co. Ltd., 2017.
- KhakaSS, *Entrepreneurship Development*, S. Chand & Co. Ltd.,Revised Edition, 2007.

Books for Reference:

- Vasant Desai, *The Dynamics of Entrepreneurship Development and Management,* Himalaya Publishing House, 6th edition, 2011
- Radha V, *Entrepreneurship Development*, Prasanna Publication House, 2008.

Open Elective IV -HUMAN RESOURCE MANAGEMENT

Course code	20KUG6EB4	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Objectives:

- To achieve a sound theoretical understanding about Human Resource Management.
- To develop knowledge and skill in handling Human Resource in an organization.
- To orient the student about the social compliance & Social Audit followed by an organization.
- To acquaint the student with the goals of the organization

Course Outcomes (CO)

CO1	Basic understanding and gain knowledge about the role and responsibilities of HR Manager.	**K2**
CO2	Develop the problem solving attitude.	**K2 &K3**
CO3	Develop the qualities to become an HR manager.	**K2 &K3**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	L	L	L	S	M		L	M	M	S	S
CO2	L	L	M	S	M		L	S	M	S	S
CO3	L	L	M	S	M		L	S	M	S	S

S – Strong; M – Medium; L - Low

UNIT – I: Introduction to Human Resource Management:

Human Resource Management: Definition, Objectives, Importance and Functions (An overview of Operative and Managerial) – **HRM Models:** Rational model, Social system model, Human resource development model - **Human Resource Policies**: Meaning, importance, types and formulation - Role of human resource manager.

UNIT – II: Acquiring Human Resources:

Human Resource Planning: Definition, Need, Process – **Job analysis:** Job Description, Job specification – **Recruitment:** Meaning, Sources of Recruitment (internal and external) – e recruitment - Recent trends in Recruitment - **Selection:** Meaning and Steps – Placement and Induction.

UNIT – III: Developing Human Resources:

Employee Training: Meaning, Objectives, Importance, Types, Methods, Needs for Training and Evaluation of Training effectiveness – **Human Resource Development:** Concept, Need, Interventions – **Performance Appraisal:** Objectives, Uses and **Methods:** Traditional and Modern methods (720 Degree performance appraisal system), Barriers of performance appraisal - Career planning, Succession planning and Competency map.

UNIT – IV: Compensation, Retaining and Controlling of Human Resource:

Wage and Salary Administration: Concept and Methods of Wages – Theories - Incentives – Job evaluation - Employee Benefits and Services. **Retaining of Human Resource**: Promotion:

Meaning, purpose, types – Demotion – Transfer – Separation. **Controlling of Human Resource**: Human Resource Records: Meaning, objectives, importance, types and Principles of Record

Keeping – Human Resource Reports – Human Resource Audit : Meaning, objectives, importance and scope – Human Resource Research: Meaning, objectives and techniques.

UNIT – V: Strategy of quality management:

Social Compliance: Definition, Meaning and Significance – **Social Compliance Audit:** Purpose, Obligations of employers, Audit process – **Social Compliance Standard:** SA 8000 (Social Accountability 8000) – **Social Compliance Training:** GSCP (Global Social Compliance Programme) – **Social Compliance Certification:** Principles, Significance of WRAP (Worldwide Responsible Accredited Production).

Strategy of quality management: Six Sigma, Keizen, TQM, TPM, QMS - ISO Systems, ISO Certification Schemes, **ISO types:** ISO 9001, 14001, ISO/TS 16949– Preparing an Organization for ISO Certification - **Quality assurance:** Mckinesey's 7s frame work, HR out sourcing – People Capacity Maturity Model (PCMM).

Books for Study:

- Biswajeet Pattanayak, *Human Resource Management*, Prentice Hall of India Private Ltd, 3rd Edition, 2005.
- Decenzo and Robbins, *Personnel/Human Resource Management*, Prentice Hall, 3rd Edition, 1987.

Books for Reference:

- Jayagopal R,*HRD Conceptual Analysis and Strategies*,Sterling, 1992
- Lynton and Pareek, *Training for Development*, SAGE India, 3rd Edition, 2011.

E-Resource:

https://www.kkahuja.com/books/HumanResourceManagement-DiscerningSlice.pdf

TOOL DESIGN - II

Subject code	20KUP6C10	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	VI

OBJECTIVES:

- Explain the basics of Die casting process.
- Explain the working of die casting machines.
- Design die casting die
- Explain the design procedure for injection moulding.
- Explain the working of injection moulding machine
- Understand the intermediate injection moulding design concepts

OUTCOMES:

CO1	Understand the concepts of design for Die Casting Process.	**K1 & K2**
CO2	Analyze and access the use of casting processes in manufacturing andunderstand the working of various casting processes	**K2,K3 &K4**
CO3	Describe methods of Injection Moulding Processes.	**K1 & K2**
CO4	Developing the knowledge in design concepts for Injection Moulding Process.	**K2,K3 &K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	M	S	S	M	M		S	S	S	M	S
CO3	S	S	S	S	M		S	S	S	S	M
CO4	S	S	S	M	M		S	S	S	M	S

S – Strong; M – Medium; L - Low

UNIT - I

Press Working Operations:- Operation for producing blanks – Shearing, cutting off, parting, blanking. Operation for cutting holes – Punching, piercing, slotting, perforating. Operations for progressive working – Notching, semi notching, lancing, parting, cutting off. Operations for size control – Trimming , slitting, shaving. Safety in press working.

Press Working Mechanism:- Presses according to their functions – energy producing press, force producing presses, stroke controlled presses. Press according to their energy supply – Mechanical, hydraulic, Pneumatic, electromagnetic presses. Presses according to their construction – Solid or gap frame, open back inclinable, knee frame, horning, open end or end wheel. Press according to their operation – Single action, double action, triple action, multi slide press.

UNIT – II

Types of Die Construction:- Cut off, drop through, return type, compound, combination, continental, sub press, follow die, progressive die, transfer die, shuttle die. Function and nomenclature of die components:- Die, die set, die plate, punch, stripper plate, Die spring, rubber keeper, stripper bolt, solid stripper, knockout plate, hold down plate, pad plate, blank holder, pressure pin, die cushion. Attachment components – Dowel, screw, key. Miscellaneous components – Heal, stop block, bolster plate, backing plate, pilot, gauges, insert, cams, hinges and rockers.

UNIT - III

Die Casting Processes:- Hot chamber process, Cold chamber process, low pressure die casting process, advantages and disadvantages, comparison of hot and cold chamber processes, applications, heat transfer in the die and methods of controlling die temperature.

Die Casting Materials:- Types of die casting alloys –metallurgy, melting & casting procedure and application of zinc based die casting alloys, Aluminum base alloys, Magnesium base alloys, Copper base alloys , Lead base alloys and Tin base alloys.

Die Casting Machines:- Plunger machine, air machine, modern cold chamber machines. Die locking methods, injection systems, automatic cycle control, interlock and safety devices in die casting machines.

Die Casting Defects: Definition, causes and remedies of defects – Shrink holes, Gas holes, Segregation, Shrink cracks, Porosity, Cold shuts, Flow lines & Blooms, Foliations, Hard spots, Surface draws and Depressions, Soldering, sink mark and excessive flash.

UNIT - IV

Die Casting Die Design: Flow system – Importance, metal flow systems in die casting dies, goose neck, nozzle, sprue, runners systems, shock absorbers, gate, gate area, gate velocity, air vent, overflow, determination of gate area. Procedure to calculate runner and gating dimensions using PQ2 diagram, calculating runner and gating dimensions without PQ2 diagram. Consideration of specification of die casting machines. Ejection systems – need and working of ejection system, Types of ejection system – sleeve, ring, blade

Injection Moulding Machines: Basic parts and functioning of an injection moulding machine. Types of injection moulding machine (Screw type & Plunger Type) – Single stage and two stage – Clamping unit (Toggle & Hydraulic) - Types of nozzles – Typical injection. Moulding cycle, Cycle time - Machine specifications (Definition only).

UNIT - V

Functional systems of injection mould – Sprue and runner - Core and Cavity- Shrinkage calculation - Core and cavity dimension. Parting surface - clamping - direct, indirect - Cooling System – Cooling Integer type cavity plates – Cooling integer type core plate - Cooling bolster – Cooling cavity inserts – Cooling core inserts – Water connection and seals. (Concept & Description of design only) - Ejection system: Ejector grid - Ejector plates assembly – Ejector rod, Ejector plate and ejector retaining plate - Methods of Ejection – Ejection from fixed half-Sprue puller.

Basic Procedure for Mould Design– Determination of mould size – Maximum number of cavities, Clamping force , Maximum clamping area, Required opening stroke. Computation of number of cavities, cavity layouts, number of parting lines, Design of runner andgate.

Alignment of Moulds: Functions of alignment, alignment with the axis of the plasticating unit, internal alignment and interlocking, alignment of large moulds. Changingofmoulds–systemforaquickchangeofmouldsforthermoplastics,mould exchanger for elastomermoulds.

Text Books:

1. Pye.R.G.W., "Injection Mould Design", Affiliated East – west press pvt Ltd, 2000
2. Athalye.A.S., 'Injection Moulding", 2nd Edn., Multi Tech Publishing Co., 1998
3. George menges and Paul mohren, “How to make Injection moulds”, Hawer publishers, 1991

Reference Books:

1. Briston and Gosselin, “Introduction to Plastics", Newnes-Butterworths, London, 1970
2. Mills.N.J., “Plastics", ELBS, 1986
3. Dominick V.Rosato and Donald V.Rosato., "Injection Moulding Hand Book", CBS Publishers & Distributors, Delhi, 1987
4. Athalye.A.S., "Plastics Materials Handbook", Multi Tech Publishing Co., 1995
5. Athalye.A.S., "Moulding of Plastics", Multi Tech Publishing Co., 1998

PROJECT

Subject code	20KUPT6PR	Credits	05	Year	III
No. of Lecture Hours	--	No. of Practical Hours	240	Sem	VI

Objectives:

Develop or Design Tool, Die, Jig or Fixture working model suitable for real practical environment by implementing the Theoretical and Practical Knowledge gained through the curriculum.

OUTCOMES:

CO1	Understand the basic concepts & broad principles of Industrial projects.	**K2, K3& K4**
CO2	Develop the Production Plan.	**K1, K2, K3& K4**
CO3	Apply the theoretical concepts to solve industrial problems with teamwork and multidisciplinary approach	**K1, K2, K3& K4**
CO4	Develop the design knowledge of Tool, Die, Jig and Fixture working model suitable for real practical environment.	**K1,K2, K3 & K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	M	S	S		S	S	S	S	M
CO4	S	S	M	S	M		S	S	S	S	M

S – Strong; M – Medium; L - Low

Develop the plan by considering the following parameters

a) Material Requirement

b) Analyze the specification and quantity of required materials

c) Cost estimation.

d) Time and resource required for completing a product

e) Man power planning

f) Maintain proper documents and reports wherever required

INTERNSHIP TRAINING-III

Subject code	20KUPT6I3	Credits	20	Year	III
No. of Lecture Hours	--	No. of Practical Hours	1200	Sem	VI

OBJECTIVES:

- To Understand the work requirement
- To Understand the customer and market requirement
- To design and modify a tool or die as per the requirement
- To Report and document completion of work
- To research the existing designs and innovate new design modifications.

OUTCOMES:

CO1	Gain practical knowledge along with work experience in addition to their academic credits	**K1 & K2**
CO2	Develop the skills which are required to get employment or to become an Entrepreneur.	**K1, K2, K3**
CO3	Develop communication, interpersonal and other required skills in the job interview process.	**K2, K3&K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M		S	M	M	M	L
CO2	S	S	S	S	M		S	S	S	S	M
CO3	S	S	M	S	S		S	S	S	S	M
CO4	S	S	M	S	M		S	S	S	S	M

S – Strong; M – Medium; L - Low

Students should undergo internship training in an esteemed Tool and Die making concern to gain hands on practice and practical industrial exposure.

Students are expected to submit their daily work report at the time of examination.

SCHEME OF EXAMINATION
(For General Education and Vocational Education Component)

General Rule of Examination:

Every student should earn a minimum attendance of 75% to become eligible to appear for Semester Examinations.

To pass in an examination, a student has to score a minimum of 40% marks in each theory & practical paper (Internal and External combined but with a minimum of 40% marks in internal and external).

Evaluation of student's performance for the theory, practical and Internship Training part includes two components.

Components	Internal Marks	External Marks	Total Marks
General and Vocational Component (Theory)	50	50	100
Vocational Component (Practical)	50	50	100
Vocational Component (Internship Training)	100	300	400

Continuous Internal Assessment:

Two CIA tests conducted for each paper during each semester.

CIA for General and Vocational component (Theory):

S.No	Type	Units	Max. Marks
1.	CIA test – I	1 & 2	**20 Marks**
2.	CIA test – II	3, 4 & 5	**25 Marks**
Total			**45 Marks**

Internal Marks (Theory):

Internal Marks- Break up (50 Marks)		
A	CIA – I & CIA – II test (45 marks converted to 30 Marks)	**30 Marks**
B	Percentage of Attendance 95% - and above - 10 Marks 90% - 94% - 8 Marks 85% - 89% - 6 Marks 81% - 84% - 4 Marks 75% - 80% - 2 Marks	**10 Marks**
C	Marks for Assignment / Seminar	**10 Marks**
Total		**50 Marks**

Internal Marks (Practical):

Internal Marks- Break up (100 Marks)		
A	Model practical Examination	**50 Marks**
B	Percentage of Attendance 95% - and above - 10 Marks 90% - 94% - 8 Marks 85% - 89% - 6 Marks 81% - 84% - 4 Marks 75% - 80% - 2 Marks	**10 Marks**
C	Record Note	**20 Marks**
D	Overall performance in the class	**20 Marks**
Total		**100 Marks**

Total 100 marks will be converted to 50 marks and the same will be awarded as an internal mark for practical.

QUESTION PAPER PATTERN

1) The question paper pattern and coverage of syllabus for each CIA and External (semester) examinations for all General and vocational component subjects except Environmental Studies.

CIA TEST – I
(Unit 1 & 2 only)

Time: 1Hour **Max. Marks: 20**

Part - A	**No choice** (Five questions from unit 1 & 2)	**5 x 2 = 10**
Part – B	**Two out of three** (Three questions from unit 1 & 2)	**2 x 5 = 10**

CIA TEST – II
(Unit 3, 4 & 5 only)

Time: 1½ Hour **Max. Marks: 25**

Part - A	**No choice** (Five questions from unit 3, 4 & 5)	**5 x 2 = 10**
Part – B	**Answer any Three questions out of Five** (Five questions from unit 3, 4 & 5)	**3 x 5 = 15**

SEMESTER EXAMINATION
(All Five Units)

Time: 2 Hours **Max. Marks: 50**

Part - A	**No Choice** (Ten questions from All five units)	**10 x 2 = 20**
Part – B	**Answer any Five questions out of Eight** (Eight questions from All five units)	**5 x 6 = 30**

2) Both internal Assessment and Semester Examination **for Environmental Studies (III semester- General Component)**will be conducted through online exam.