

6.1 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

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RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from “Human Science” subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims at developing conceptual understanding for setting-up one’s own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager. Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma pass-outs for enhancing their employability and self confidence.

LEARNING OUTCOME

After undergoing the subject, the student will be able to:

- Explain the importance of generic skills
- Demonstrate self development
- Manage himself/herself physically, intellectually and psychologically
- Work effectively as a team member
- Manage tasks effectively
- Apply knowledge to solve problems
- Develop an entrepreneurial mindset.
- Identify entrepreneurial support system for new ventures and small businesses.
- Recognize a business opportunity.
- Prepare project report
- Demonstrate how to launch an individual's entrepreneurial career

DETAILED CONTENTS

- | | | |
|----|---|----------|
| 1. | Introduction to Generic Skills | (04 hrs) |
| | 1.1 Importance of Generic Skill Development | |
| | 1.2 Global and Local Scenario of Generic Skill Development | |
| | 1.3 Life Long Learning and associated importance of Generic Skill Development | |

2. Managing Self (08 hrs)
 - 2.1 Knowing Self for Self Development
 - Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
 - 2.2 Managing Self - Physical
 - Personal grooming, Health, Hygiene, Time Management
 - 2.3 Managing Self – Intellectual development
 - Information Search: Sources of information
 - Writing Skills – Official & business correspondence, Job application covering letter and resume
 - Speaking Skills – Mock interview, Preparing for meeting, Group discussion
 - 2.4 Managing Self – Psychological
 - Stress, Emotions, Anxiety-concepts and significance
 - Techniques to manage stress
3. Managing in Team (06 hrs)
 - 3.1 Team - definition, team dynamics
 - 3.2 Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background
4. Task Management (03 hrs)
 - 4.1 Task Initiation, planning, execution, close out
 - 4.2 Exercises/case studies on task planning towards development of skills for task management
5. Problem Solving (05 hrs)
 - 5.1 Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving
 - 5.2 Different approaches for problem solving.
 - 5.3 Steps followed in problem solving.
 - 5.4 Exercises/case studies on problem solving.
6. Entrepreneurship (22 hrs)
 - 6.1 Introduction
 - Concept/Meaning and its need
 - Qualities of an entrepreneur
 - Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

- 6.2 Market Survey and Opportunity Identification (Business Planning)
- How to start a small scale industry
 - Procedures for registration of small-scale industry
 - Assessment of demand and supply in potential areas of growth.
 - Understanding business opportunity
 - Considerations in product selection
- 6.3 Project Report Preparation
- Preliminary Project Report
 - Techno-Economic Feasibility Report
 - Preparation of Detailed Project Report

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

RECOMMENDED BOOKS

1. Soft Skills for Interpersonal Communication by S. Balasubramanian Published by Orient Black Swan, New Delhi.
2. Generic Skill Development Manual, MSBTE, Mumbai.
3. Lifelong learning, Policy Brief (www.oecd.org)
4. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
5. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
6. Handbook of Small Scale Industry by PM Bhandari

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	05
2.	08	15
3.	06	10
4.	03	10
5.	05	10
6.	22	50
Total	48	100

6.2 TRACTOR AND HEAVY EARTH MOVING EQUIPMENT

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RATIONALE

Diploma holders in Automobile Engineering may have to deal with repair and maintenance of tractors and earth moving machinery. This subject provides knowledge about such vehicles and equipment

LEARNING OUTCOMES :

At the end of the course, students will be able to:

- Explain the classifications and function of tractors and their functions.
- Explain the functions of hydraulic system and supplementary system
- Specify wheels and tyres
- Describe the working principles of earth moving machinery like bulldozer, scraper, leveler, front end loader, cranes.
- Identify common faults in tractors

DETAILED CONTENTS

1. Tractor (12 hrs)
Classification of tractors, main tractor assemblies, functions of farm tractors, types of engine used, power requirement, human factor in tractor design, applications of tractors, Basics trends in tractor design,
2. Hydraulic System (8 hrs)
Functions of hydraulic system, hydraulic components, method of attaching implements, classification of hydraulic controls for hitches, integral hitch system, draft control system. Position control and Mixed control
3. Tractor Chassis (8 hrs)
Salient features of engine, clutch, power transmission, final drive, brakes and steering of Indian tractors.
4. Supplementary System (6 hrs)
Power take off shaft, draw bar working, belt pull traction control unit, three point linkages
5. Tractor Wheels and Tyres (10 hrs)
Salient features of wheels, tyres and wheel base/wheel tracks. Specifications of wheels and tyres, dual versus tandem tyres, tread design, effect of tyre inflation. Prominent make of Indian – Tractors. Selection criteria, maintenance and operation of tractors, differential lock.

6. Earth Moving Machinery (12 hrs)

Description and working principles of:

- Bull Dozer
- Leveller
- Front end loader
- Cranes
- Scrapper

7. Repair and Maintenance (8 hrs)

Faults and their rectification in tractor and maintenance of tractor.

RECOMMENDED BOOKS

1. Farm Machines and Equipment by CP Nakra; Dhapat Rai and Sons, New Delhi.
2. Manual of Tractors by J Konard, Asia Publishing House.
3. Tractors and Agriculture Equipment by Jain and Roy.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	20
2	8	12
3	8	12
4	6	10
5	10	16
6	12	20
7	8	10
Total	64	100

6.3 PRODUCTION PLANNING AND COSTING

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RATIONALE

A diploma holder in Automobile Engineering is supposed to look after the planning, scheduling and production control activities in the industry. He is also required to have knowledge about cost estimation of new and repaired components, material management, quality aspects and productivity. Therefore it is essential to teach above topics.

LEARNING OUTCOMES :

At the end of this course, students will be able to:

- Apply the principles of costing in product costing
- Prepare budgets based on the level of activity and to use concept for production cost control
- Apply the principle and techniques in production planning and control of a production system
- Control quality by using different levels of inspection techniques of various stages of production

DETAILED CONTENTS

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|----|---|----------|
| I. | Introduction to Production Planning and Control | (04 hrs) |
| | 1.1 .Necessity of planning and control. | |
| | 1.2. Functions of production, planning and control department, Factors determining control procedure. | |
| | 1.3. Advantages of Production Planning & Control | |
| | 1.4 Types of production. | |
| 2. | Planning | (08 hrs) |
| | 2.1 Forecasting | |
| | 2.2 Material planning and allocation | |
| | 2.3. Allocation for optimum utilization | |
| | 2.4. Break even analysis. | |
| | 2.5. Procedure for process planning. Process planning sheet. | |
| | 2.6. Calculation of man and machine hours. | |
| 3. | Production Control | (08 hrs) |
| | 3.1. Objectives | |
| | 3.2. Routing | |
| | 3.3. Loading and scheduling | |
| | 3.4. Dispatching | |
| | 3.5. Follow up | |

4. Inspection and Quality Control (12 hrs)
- 4.1. Inspection - Need and Planning for Inspection
 - 4.2. Types of Inspection
 - 4.3. Role of Operator and Inspector in Inspection
 - 4.4. Quality Control and Quality Assurance - Meaning and Need
 - 4.5. Statistical Quality Control
 - 4.6. Acceptance Sampling
 - 4.7. Control Charts for variables and Attributes
 - 4.8. QC tools
 - 4.9. Introduction to 5S and Kaizan technique.
5. Standards and Codes (04 hrs)
- 5.1. National and International Codes
 - 5.2. Concept, elements, benefits and implementation of Quality Management System (ISO 9000) and environmental Management System (ISO 14000), Quality Circles
6. Introduction to Estimating and Costing (02 hrs)
- 6.1. Meaning and importance of estimating and costing.
 - 6.2. Difference between estimating and costing.
 - 6.3. Importance of preparing realistic estimates.
 - 6.4. Estimating procedures.
7. Elements of Cost and Estimation (20 hrs)
- 7.1. Terms used in costing
 - 7.2. Direct materials - components
 - 7.3. Direct costs e.g. labour, raw material, hired equipment, machines and equipment, components
Indirect materials such as lubricants, cotton waste and indirect labour.
Overhead expenses - rent of building, office expenses, depreciation and service charges
 - 7.4. Profits – Concepts and requirements
 - 7.5. Variable and fixed cost, production cost
 - 7.6. Perception of job/work order
 - 7.7. Different units of work (Bifurcation as per type, section).
 - 7.8. Analysis of time – Handling time, preparation time, production cycle time, inspection and dispatch time
 - 7.9. Computation of charges.
 - 7.10. Operator charges, supervisory charges, storage charges, components charges, material charges, consumable stores charges, Total charges.
Estimation of service charges, overhauling
 - 7.11. Estimation for machining, casting, forging, welding and fabrication
 - 7.12. ABC analysis
 - 7.13. JIT

8. Productivity (06 hrs)
- 8.1 Production, productivity,
 - 8.2 Factors affecting productivity,
 - 8.3 Measurement of productivity
 - 8.4 Causes of decrease in productivity

INSTRUCTIONAL STRATEGY

Efforts should be made to relate process of teaching with direct experiences in the industry. Students should be taken to various industrial enterprises for better conceptualization of specific topics such as production planning, inspection and quality control. Simple problems on costing should be given to students for comprehension

RECOMMENDED BOOKS

1. Production Estimating and Costing by M. Adithan and B.S. Pabla, Konark Publishers, Delhi
2. Industrial Engineering and Management by T.R Banga, and S.C. Sharma, Khanna Publishers, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	04	06
2	08	12
3	08	12
4	12	20
5	04	06
6	02	04
7	20	32
8	06	08
Total	64	100

6.4 MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT

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RATIONALE

A diploma holder in Automobile Engineering is supposed to have knowledge about significance of vehicle accident, accidental vehicle claim procedure from insurance company and about Motor Vehicle Act. Therefore, it is essential to teach Motor Vehicle Act features and appropriate practices covering Motor Vehicle Act. Further, knowledge of transport management systems and techniques would also be an asset to him.

Learning Outcomes :

At the end of this course, students will be able to:

- Describe different section under motor vehicle act
- Explain various types of insurance used in vehicle and work role of surveyor
- Drive vehicle in different road conditions
- Analyse different aspects of transport modes
- Explore variety in garage with its types
- Manage a auto workshop related to store of different parts

DETAILED CONTENTS

1. Motor Vehicle Act (10 hrs)
 - 1.1 .Motor Vehicle Act - Main Provisions
 - 1.2. Salient features of Motor Vehicle Act. Requisites and formalities for following:
 - Licensing of drivers and conductors of motor vehicles.
 - Registration of old and new vehicles
 - Control of transport vehicles
 - Transfer of vehicle - Local and State to State
 - Different forms, application for various uses
 - Traffic offences, penalties and procedures

2. Inspection and Fitness of Vehicle (04hrs)
 - 2.1. Fitness of vehicle -meaning and purpose, provisions in the act,
 - 2.2. Detailed procedure and requirements for vehicle inspection

3. Insurance of Vehicles (06 hrs)
 - 3.1. Meaning of Insurance and its necessity
 - 3.2. Different types - comprehensive and third party insurance
 - 3.3. Procedure to get Accidental claim and compensation
 - 3.4. Surveyor duties
 - 3.5. Relation between company and surveyor
 - 3.6. Duties of driver in case of accident and injury to a person

4. Vehicle Finance (04 hrs)
 - 4.1. Sources and types of finance
 - 4.2. Rate of interest, incentives
 - 4.3. Net borrowing rate, documents required.

5. Driving (06hrs)
 - 5.1. Principle of driving
 - 5.2. Driving procedure
 - 5.3. Driving precautions
 - 5.4. Driving in abnormal conditions, like hilly area, night, fog, heavy traffic and rain
 - 5.5. Emergency Driving situations
 - 5.6. Driving License - purpose, importance and requirements
 - 5.7. Different types of driving license
 - 5.8. Procedure to get driving license

6. Road Safety (04 hrs)
 - 6.1. Road Signs/signals
 - 6.2. Traffic rules
 - 6.3. Imposition of Penalties for violation of rules
 - 6.4. Duties of Driver, Conductor and Helper towards safety of vehicles/passengers/goods and self

7. Transport Management (14 hrs)
 - 7.1. History of transport with special reference to road transport in India
 - 7.2. Modes of Road transport
 - 7.3. Organization- Service station and its functions, General layout of modern service station, Spare parts section and dealership service section, Accounts and books, Different types of cards and their use in maintaining service station records
 - 7.4. Structure of fleet organization
 - 7.5. State transport - optimum utilization of fleet, theory of fares/freight
 - 7.6. Roadworthiness requirement

 - 7.7. Maintenance of logbook, History sheet, Causes, and prevention of Road Accident, Analysis of Accident, Economy of replacement, Assessment of

used vehicles for sale and purchase, Training of Drivers and Mechanics.

- 7.8. Taxation – Structure and formalities relating to calculating and paying the relevant taxes.
- 7.9 Central Motor Vehicle Rules – Main features
- 7.10 Vehicle safety standards and regulations
- 7.11 High security registration plates

INSTRUCTIONAL STRATEGY

Teacher should lay emphasis on basic principles and practices covering Motor Vehicle Act and fleet management. Visits should be organized to service stations for understanding of topics.

RECOMMENDED BOOKS

1. Automobile Engineering Vol.I by Dr. Kirpal Singh, Standard Publisher Distributors, Delhi.
2. Transport Management Vol. III & IV by Central Institute of Road Transport, Pune.
3. Motor Vehicle Act of India (with Latest Amendment).
4. Motor Vehicle Act with Rules by B.S. Kohli.
5. Motor Transportation: Principles and Practices by WJ Hudson and James; Ronald Press Company, New York.
6. Transport in Modern India by KP Bhatnagar, Satish Bahadur, DN Aggarwal and SC Gupta.
7. Central Motor Vehicle Rules.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	10	20
2	04	08
3	06	14
4	04	08
5	06	12
6	04	08
7	14	30
Total	48	100

6.5 AUTO REPAIR, MAINTENANCE AND DRIVING PRACTICE - II

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RATIONALE

A diploma holder in Automobile Engineering, should have reasonable practice on fault diagnosis with the help of latest machines like engine analyzer etc. Stress has also to be laid on the use of exhaust gas analyzer and other machines for the maintenance of automobiles. Student should also be proficient in driving and maintenance of vehicle. Hence this subject.

Learning Outcomes:

At the end of this course, students will be able to:

- Carry out trouble shooting of engine
- Analyze engine performance data and determine the proper repair procedure
- Overhaul wheel, axle and brakes
- Carry out repair of engine fuel system
- Carry out wheel alignment and wheel balancing
- Prepare preventive maintenance schedule
- Drive a vehicle safely under different conditions.

LIST OF PRACTICALS

1. Trouble shooting of engine: Diagnosing and rectifying the following troubles- Engine overheating, high oil consumption, engine noises and knock, high fuel consumption, starter turns the engine but engine doesn't start, engine fires but dies out, engine misfires, lack of power, poor acceleration, engine produces black and white smoke, low oil pressure, engine seizure, excess blow by.
2. Decarbonising of engine - removing carbon deposits from engine combustion chamber, piston crown, valve parts.
3. Valve servicing:
Refacing, seat reconditioning, lapping, testing, replacing worn out parts and tappet adjustment. Servicing of valves and valve mechanism – Replacement of valves, valve seats, valve guides, checking and replacement of defective springs, refacing of valves, tappet and rocker arm and adjusting valve tappets
4. Reconditioning of engine - Measuring of bore for wear and ovality, servicing the cylinder bore, replacing of piston and piston rings.
5. Inspection of crank shaft – bearing replacement and setting of journal bearing. Crank pin bearings and crank shaft bearings, measuring bearing clearances by gauges.

6. Surfacing of cylinder head, cylinder block and manifolds with cylinder head refacing machine..
7. Practice in honing cylinder block, keeping allowance of clearances.
8. Practice in rim straightening
9. Testing of fuel injectors (diesel engine)
10. Servicing of wheel and axles.
11. Bleeding and servicing of brakes.
12. Practice in brake drum turning, measuring ovality, skimming the brake drum.
13. Tyre retreading. (The students may be taken to a service industry).
14. Practice in wheel balancing
15. Practice in wheel alignment
16. Practice in automatic tyre changers
17. Checking the run out using dial gauge
- 18-25 Driving Practice on the road to gain proficiency in driving. 50% of the time of the subject should be given to driving.

Note:

Visit to an automobile or tractor industry/workshop at least for two days. is essential.

RECOMMENDED BOOKS

1. Automobile Engineering by Dr. Kirpal Singh; Standard Publisher, Delhi.
2. Automobile Engineering by R.B. Gupta; Satya Prakashan, New Delhi.
3. Maintenance and Repair of Motor Vehicle by H.O. Geneva; , R-686, New Rajinder Nagar, New Delhi.

6.6 PROJECT WORK

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RATIONALE

Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period.

LEARNING OUTCOMES

After undergoing the project work, students will be able to:

Apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place the learner for project oriented practical training in actual work situation for the stipulated period with a view to:

- Develop understanding regarding the size and scale of operations and nature of field-work in which students are going to play their role after completing the courses of study
- Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
- Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

General Guidelines

The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

This practical training cum project work **should not be considered** as merely conventional industrial training in which students are sent at work places with either

minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

The projects given to students should be such for which some one is waiting for solution. Some of the suggested project activities are given below:

1. Projects connected with repair and maintenance of machines .
2. Estimating and costing projects.
3. Design of jigs / fixtures.
4. Projects related to quality control.
5. Project work related to increasing productivity.
6. Projects relating to installation, calibration and testing of machines.
7. Projects related to wastage reduction.
8. Project, related to fabrication.
9. Energy efficiency related projects.
10. Projects related to improving an existing system

NOTE: Each student has to take one project individually and one to be shared with a group of four-five students depending upon cost and time involved. There is no binding to take up the above projects as it is only a suggestive list of projects.

A suggestive criterion for assessing student performance by the external (person from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance Criteria	Max.** Marks	Rating Scale				
			Excellent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	10%	10	8	6	4	2
2.	Planning and execution of considerations	10%	10	8	6	4	2
3.	Quality of performance	20%	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20%	20	16	12	8	4
5.	Sense of responsibility	10%	10	8	6	4	2
6.	Self expression/ communication skills	5%	5	4	3	2	1
7.	Interpersonal skills/human relations	5%	5	4	3	2	1
8.	Report writing skills	10%	10	8	6	4	2
9	Viva voce	10%	10	8	6	4	2
Total marks		100	100	80	60	40	20

The overall grading of the practical training shall be made as per following table.

In order to qualify for the diploma, students must get “Overall Good grade” failing which the students may be given one more chance to improve and re-evaluate before being disqualified and declared “not eligible to receive diploma”. It is also important to note that the students must get more than six “goods” or above “good” grade in different performance criteria items in order to get “Overall Good” grade.

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	79 < > 65	Very good
iii)	64 < > 50	Good
iv)	49 < > 40	Fair
v)	Less than 40	Poor

Important Notes

- 1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.**
- 2. The criteria for evaluation of the students have been worked out for 200 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.**
- 3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.**
- 4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.**

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work