VTU QUESTION PAPER SOLUTION

CONSTRUCTION MANAGEMENT & ENTREPRENEURSHIP(18CV51)

1. a) Define Management.Explain the characteristics of management.

b) What are funcions of management?

Ans: Management is the art of getting things done through people. Managers achieve organizational goals by enabling others to perform the necessary tasks by effectively identifying right person for right task.

Nature and Characteristics of Management

1. Management is a Universal Process (applies to all types of institutions)
2. Management is Goal Oriented (aimed at accomplishing specific goals)
3. Management is a Social Process (deals with human beings)
4. Management is a Coordinating Force (avoiding duplication and overlapping)
5. Management is Intangible (it is an unseen force)
6. Management is Dynamic (an ongoing process)
7. Management is Multi-disciplinary (it draws knowledge from various disciplines)
8. Management is a Creative Activity
9. Management is Decision Making
10. Management is a Profession

Management is a Universal Process: The principles and concepts of management are applicable to every type of industry. The practice of management is different from one organization to another according to their nature.

Management is Goal Oriented: This means that Management is always aimed at achieving specific goals. In fact, the success of Management is measured by the extent to which the desired objectives are achieved.

Management is a Social Process Management basically deals with managing human beings and their emotions, talents, attitudes, culture, ethics, education, etc. Management is therefore a social process because it involves people who are influenced by social traditions, customs and regulations.

Management is a Coordinating Force: Management co-ordinates the efforts of the employees in an organization through orderly arrangement of activities so as to avoid duplication and overlapping

Management is Intangible : It means that Management cannot be touched and felt. It does not have a physical presence. It is an unseen force. Its presence can only be felt by the results of its efforts such as orderliness, efficiency, profits, working climate, employee satisfaction, etc.

Management is Dynamic: Management is not static. Over a period of time new principles, concepts and techniques are developed and adopted by management. Management is changed accordingly to the social change. A principle is truth which establishes cause and effect relationships of a function. Principles are developed by integration of ideas from various disciplines supported by practical evidence. These principles are flexible and change with the environment in which organization works. Continuous researches are being carried on to establish new principles; many older principles are changed by new principles. There is nothing permanent in management.

Management is Multi-disciplinary :Management is multidisciplinary. It draws freely ideas and concepts from the disciplines like economics, sociology, psychology, statistics, operations research etc. Management integrates the ideas taken from various disciplines and presents newer concepts which can be put into practice. The integration of these ideas is the major contribution of management.

Management is a Creative Activity: Management provides creative ideas and new imagination apart from giving progressive vision to group efforts.

Management is Decision :Making Decision-making is selecting the best among alternative courses. Decision-making is an important function of a manager. Whatever a manager does, he does it by making decisions. The success or failure of an organization depends upon the quality of decision. A manager must make a right decision at right time

Management is a Profession: Management is a profession because it possesses the qualities of a profession. The knowledge is imported and transferred. The established principles of management are applied in practice.

Functions of Management

1. Forecasting (estimation of future sales)
2. Planning (avoid difficulties that may arise in future)
3. Organizing (arranging money, material, machinery, men, etc., of actual execution of work)
4. Staffing (involves recruitment, selection, training and development of personnel required to run the organization)
5. Directing and Motivating (the recruited employees so that they perform their duties effectively)
6. Controlling (the work of employees to ensure everything is proceeding as per plan)
7. Co-ordinating (the efforts of all employees in all departments to move towards common goals)
8. Communication (system should be efficient so as to avoid confusion and misunderstanding)
9. Leadership (qualities required in managers & supervision)
10. Decision Making (to be professional and result-oriented)

Forecasting:

Forecasting is nothing but the estimation of future events. Forecasting involves not only estimation of quantity of future sales but also as to when it should be available, where it should be available and at what quantity level. Sales forecast is usually followed by production forecast and forecasts for costs, finance, purchase, profit or loss, etc.

Planning:
Planning is the primary function of management. It is looking ahead and preparing for the future. It determines in advance what should be done. It is conscious determination of future course of action. This involves determining why to take action? What action? How to take action? When to take action? Planning involves determination of specific objectives, programs, setting policies, strategies, rules and procedures and preparing budgets. Planning is a function which is performed by managers at all levels – top, middle and supervisory. Plans made by top management for the organization as a whole may cover periods as long as five to ten years, whereas plans made by low level managers cover much shorter periods.

Organizing:
Organizing is the distribution of work in group-wise or section wise for effective performance. Once the managers have established objectives and developed plans to achieve them, they must design and develop a human organization that will be able to carry out those plans successfully. Organizing involves dividing work into convenient tasks or duties, grouping of such duties in the form of positions, grouping of various positions into departments and sections, assigning duties to individual positions and delegating authority to each position so that the work is carried out as planned. According to Koonz O'Donnel, "Organization consists of conscious coordination of people towards a desired goal". One has to note that different objectives require different kinds of organization to achieve them. For Example, an organization for scientific research will have to be very different from one manufacturing automobiles.

Staffing:
Staffing involves managing various positions of the organizational structure. It involves selecting and placing the right person at the right position. Staffing includes identifying the gap between manpower required and available, identifying the sources from where people will be selected, selecting people, training them, fixing the financial compensation and appraising them periodically. The success of the organization depends upon the successful performance of staffing function

Directing and Motivating:
Planning, organizing and staffing functions are concerned with the preliminary work for the achievement of organizational objectives. The actual performance of the task starts with the function of direction. This function can be called by various names namely "leading", "directing", "motivating", "activating" and so on. Directing involves these sub functions:
(a) Communicating: It is the process of passing information from one person to another.
(b) Leading: It is a process by which a manager guides and influences the work of his subordinates.
(c) Motivating: It is arousing desire in the minds of workers to give their best to the enterprise.

Controlling:

Planning, organizing, staffing and directing are required to realize organizational objectives. To ensure that the achieved objectives confirm to the pre-planned objectives control function is necessary. Control is the process of checking to determine whether or not proper progress is being made towards the objectives and goals and acting if necessary to correct any deviations. Control involves three elements:
(a) Establishing standards of performance. --- BASE LINE
(b) Measuring current performance and comparing it against the established standard.
(c) Taking action to correct any performance that does not meet those standards.

Co-ordinating:
In an organization, there may be many departments and a large number of workers working at various levels and at various work centres. In this situation there is a need to co-ordinate the individual efforts of all workers towards common goals. Co-ordination is the orderly arrangement of group effort to provide unity of action

Communication:
Communication is the process by which instructions are transmitted, received and understood by people working in the organization. Communication of ideas, thoughts or information plays an important role in the working atmosphere of any organization.

Leadership:
Leadership is the quality of the behaviour of a manager where he inspires confidence and trust in his subordinates, gets maximum cooperation from them and guides them towards company goals.

Decision Making:
A decision is defined as a course of action chosen from available alternatives for the purpose of a desired result. If there is one activity which can be considered the most important among all other activities at higher levels of management, it is decision making.

2 a).Explain in detail, construction project formulations?

Ans:

Project – Construction Project

PMBOK – Project Management Body of knowledge says “Project as a Temporary Endeavour undertaken to provide a unique product or service”.
The product in case of construction project is the constructed facility – say building, Roads, Dams, Infrastructure etc. The constructed facilities are supposed to adhere to some predetermined performance objectives-Services like

Design, Planning, Execution so on. Construction projects involve Manpower and their duration can range from a few weeks to more than five years. Each one of them is “Unique” and “Temporary” in nature and so is management involved.

- Unique – Every Project is different in some way from other projects.
- Temporary – every project have definite start and end.

The art of Construction has slowly developed into a science over the centuries. Civil Engineers are involved from conception to physical realization of the facility.

Examples: Construction of 4 Storey residential building Construction of water treatment plant.

Management of this temporary Endeavour is Project Management and it is Civil Engineering/Construction Endeavour.

It is called as Construction Project Management OR Construction Management.

Management of routine operations in an organization is termed as “Operational Management”.

Example: Daily Maintenance of Water supply to city (Supply & Maintenance). Maintenance of Road etc. Facility – Infrastructure Facility Means product – created thorough construction.

“Project-Management is the art & science of converting the client vision into reality by working efficiently, effectively & safely”.

BS 6079-2000: “Planning, Monitoring and Controlling of all aspects of a project and the Motivation of all those involved in it to achieve the project objectives on time and to specified cost & quality & performance.”

“Construction Project Management is the art and science of Managing all aspects of the project to achieve the project mission objectives, within the specified time, budgeted cost and predefined quality specification’s working efficiently & effectively in the changing project environments with due regard to construction manpower, health & safety and safeguarding the environment surrounding from ill/ Hazards”

Civil Engineering Projects or Construction

iBuildings
ii. Transportation System’s
iii. Hydraulic Structure
iv. Energy Harvesting System
v. Offshore Structure
vi. Space Based & Defence Structures
vii. Industrial Structures viii. Communication System’s
ix. Water and Waste Water Treatment Plant
x. Recreational Parks

i Buildings: “Residential type, Commercial type and other buildings including service oriented. (Academic buildings like Educational (Schools, Colleges, Universities, Laboratory), Hospitals, Temples, Govt. & Pvt. Offices, Commercial Complexes, Malls, recreational building such as auditorium’s, sports complex, stadium, Cinema halls, Theatres, stores, Ware house, Light Manufacturing plants ….

ii. Transportation System’s – In land, Water ways, Air Roads, Bridges flyover, Railways, Airports, Sea port, urban mass transit system. Monorail, Metro, rope ways, Tunnels – Road/Railways underground – on ground, Town planning – Basic Infrastructure projects.

iii. Hydraulic Structure: Dams, Canal, Barrages, Hydroelectric Power plants, tunnel’s Embankment - Earth Barrage, Flood Control System.

iv. Energy Harvesting System: Fossil Fuel: Thermal and Nuclear Power Plants Clean Energy: Wind, Solar and Sea wave.

v. Offshore Structure: These are massive steel & concrete structure in Sea, used usually for Oil & Gas extraction, Storage & Transportation.

vi. Space Based & Defence Structures – Bunkers, Silo, Rocket Launching Pad etc.,

vii. Industrial Structures: Petrochemical refineries, small & large scale manufacturing plants, Silo, bunker, Mine development.

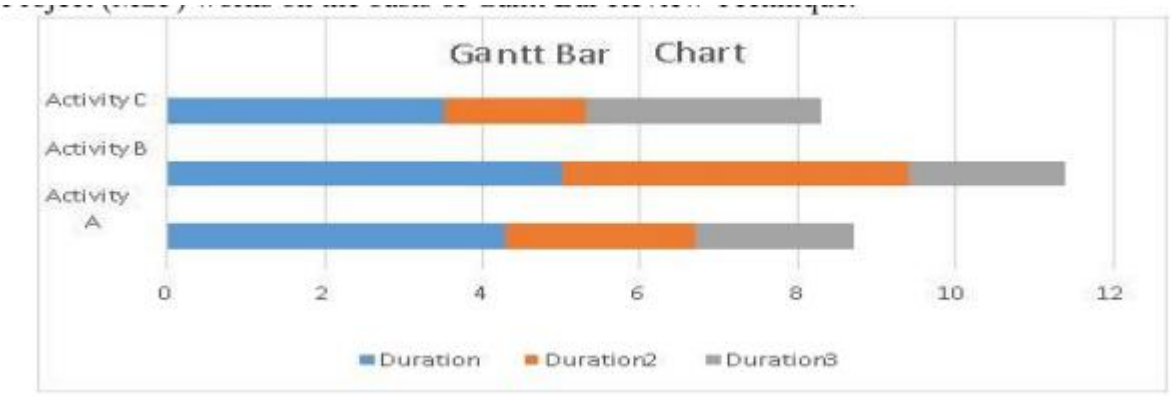
viii. Communication System’s: Transmission line, Communication Network, TV tower, Satellite signal receivers etc.,

ix. Water and Waste Water Treatment Plant, Sea water desalinator, Water intake Structures, Water Storage Units, Water distribution Networks, Sewage Treatment Plant, Storm water collection system, sewage disposal system.

x. Recreational Parks, studios and special projects. Anything physical immovable facility required for Human civilization as basic need, for progress we make it to happen/provide.

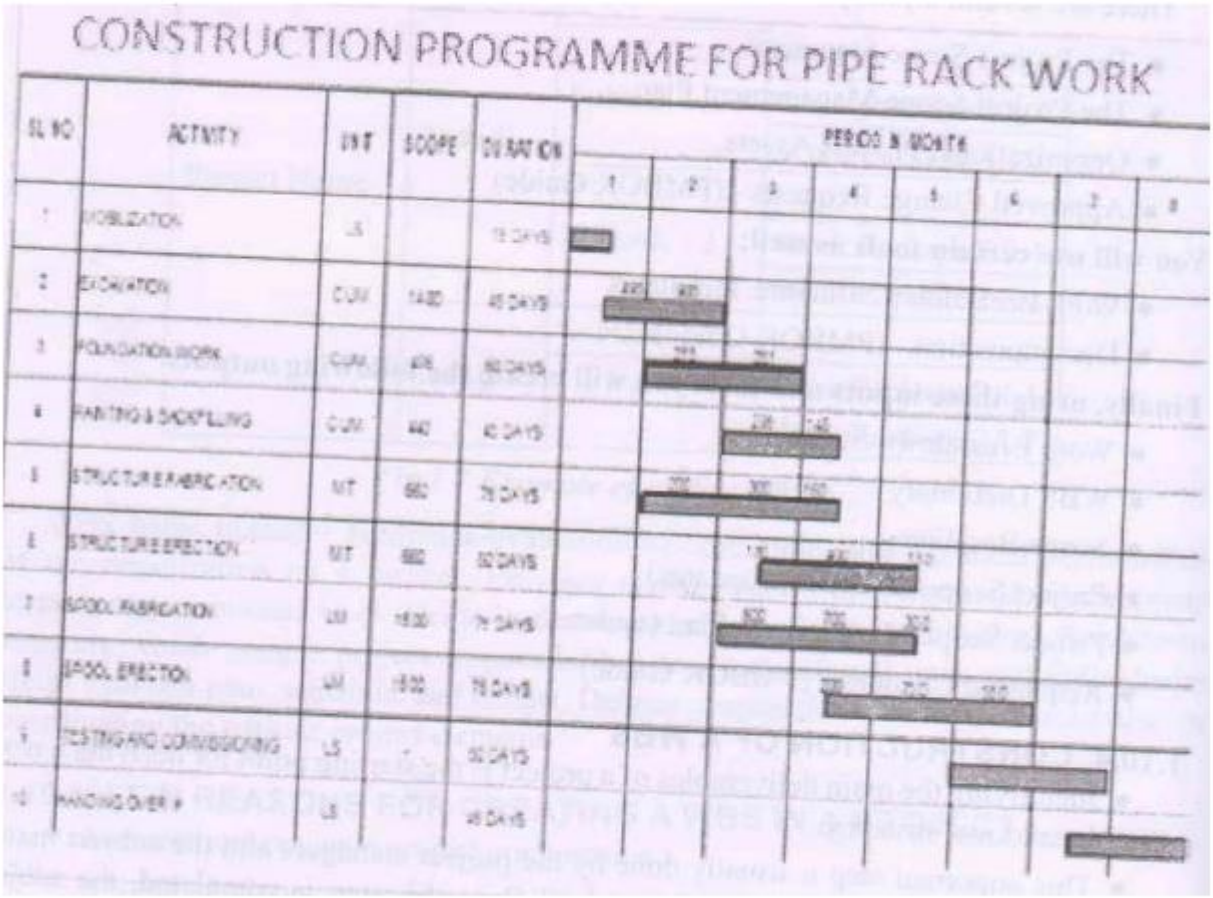
2 b) Define Grantt chart?

Ans: Developed by Henry L Gantt in 1990. The Gantt bar chart is a linear calendar on which the time is spread along the abscissa and activity is indicated along the ordinate. Microsoft Project (MSP) works on the basis of Gantt Bar Review Technique.



GANTT Chart

A GANTT chart is a type of bar chart that illustrates a project schedule. After the PERT/ CPM analysis is completed, the following phase is to construct the GANTT chart and then to reallocate resources and re-schedule if necessary. GANTT charts have become a common technique for representing the phases and activities of a project work breakdown structure. It was introduced by Henry Gantt around 1910 — 1915.



Characteristics

i. The bar in each row identifies the corresponding task
ii. The horizontal position of the bar identifies start and end times of the task
iii. Bar length represents the duration of the task
iv. Task durations can be compared easily v. Good for allocating resources and re-scheduling
v. Precedence relationships can be represented using arrows vii. Critical activities are usually highlighted
vi. Slack times are represented using bars with doted lines
vii. The bar of each activity begins at the activity earliest start time (ES)
viii. The bar of each activity ends at the activity latest finish time (LF).

Advantages:

i. Simple
ii. Good visual communication to others
iii. Task durations can be compared easily
iv. Good for scheduling resources

Disadvantages

i. Dependencies are more difficult to visualize
ii. Minor changes in data can cause major changes in the chart

Constructing GANTT Chart

I. The steps to construct a GANTT chart from the information obtained by PERT/CPM are:
II. Schedule the critical tasks in the correct position.
III. Place the time windows in which the non-critical tasks can be scheduled.
IV. Schedule the non-critical tasks according to their earliest starting times.
V. Indicate precedence relationships between tasks.

2 c) Explain with example concept of activity on arrow and activity on node?

Ans: Concept of Activity on Arrow and Activity on Node

Activity on Arrow (AoA) and Activity on Node (AoN) come under the Program Evaluation and Review Technique (PERT), which is a well-known method that is used to analyse various tasks when it comes to completing a project, especially when it comes to the time that is required to complete each task and the minimum amount of time that is required to complete the entire project.

Traditionally, activity sequence diagrams utilize boxes or even rectangles in order to w the activities, which are known as nodes. These nodes are made to connect with other nodes by the use of arrows; this would indicate the dependencies that are present between connected activities

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When it comes to AoA diagrams, showing the finish-to-start relationships is a limited affair. What this means is that the arrow represents the time span from the event at the start of the arrow to the event at the end. Activities that are represented as arrows have to be added to 47 illustrate some of the more complicated relationships and dependencies that are present between the activities.

However, when it comes to AoN diagrams, the activity is placed on the node. The interconnection arrows would illustrate the dependencies that are there between the activities. They are more flexible and are capable of illustrating the main relationship types. Since the activity is on a node, the data usually can be placed on the activity.

Also, since the activities are placed on the nodes in an AON diagram, the arrows can go in any direction. Hence representing a wide range of dependencies (start to finish, start to start, finish to start, finish to finish).

Difference between AOA & AON Network

Activity on Arrow (A-O-A)	Activity on Node (A-O-N)
It is composed of arrows and nodes. The arrows represent the activities and nodes represent the events.	In A-O-N networks, the nodes represent the activities and the arrows, their interdependencies or precedence relationships.
Each activity carries a brief description usually printed on the logical diagram. The activity name or symbol and the time duration.	Nodes are usually represented by squares or rectangles, but circles and other convenient geometrical shapes may also be used.
At present, this method seems to be the most popular method and it was the first method to be introduced, developed and computerized.	Activity number and description are written within the boxes representing the nodes.
	Length and direction of the arrows have no significance as they indicate only the dependency of one activity on another.

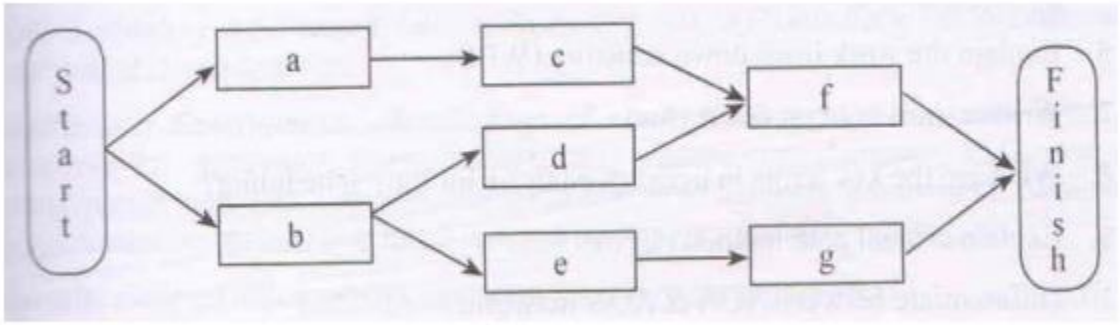
Activity-On-Node (A-O-N) Diagram have the following advantages on Arrow Diagram:

I. Flexibility since logic is defined in two stages.
II. Dummy activities are eliminated.
III. iii. Revision and introduction of new activities is simple.
IV. iv. Overlapping and delaying of activities is easily defined.
V. v. Use of pre-printed sheets is possible

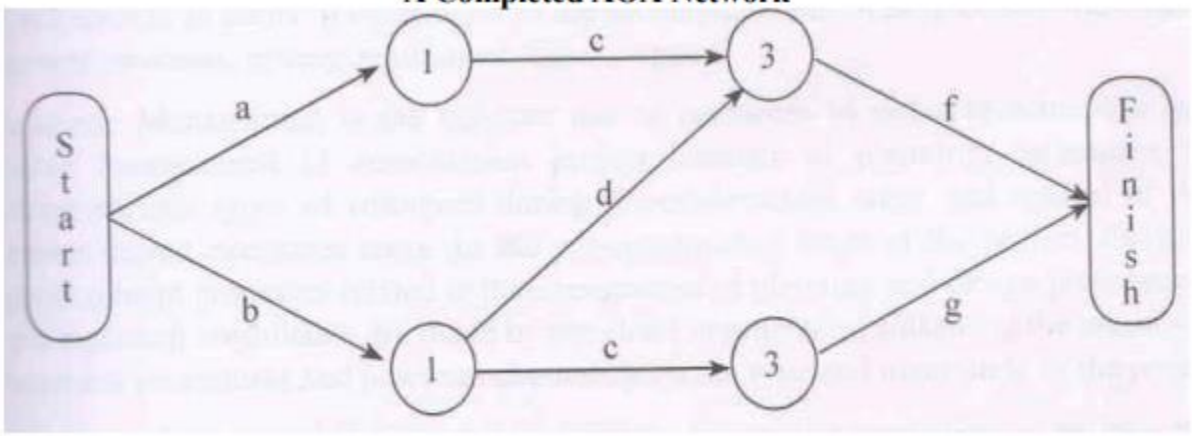
Example: Set of Project Activities and Precedence: Use AON and AOA

Task	Predecessor
a	-
b	-
c	a
d	b
e	b
f	c, d
g	e

A Completed AON Network



A Completed AOA Network



3. Write a short note on class of labour?

Ans: CLASS OF LABOUR

A construction activity is a very complex process, made up of many different systems, such as the structural system, exterior enclosure system, and HVAC system. These systems can be broken down into many more subsystems and sub subsystems. In this way, a construction project is divided into numerous work packages. These work packages can then be assigned to and completed by an individual worker or a crew. A crew is a team of workers, which can be of the same trade or a composite of many different trades. Due to the diverse nature of the different tasks associated with all the building systems, many types of craftsmen from many different trades are required in a construction project.

List of types of workers that can be involved in a construction project are as follows

BUILIDING TRADERS

Carpentry Work

1. Shuttering carpenter

2. Furniture carpenter

3. Wood Polisher

4. Carpenter helper

Masonry Work

1. Concrete helper

2. Masonry Work

3. Concrete mason

4. Blockwork and plaster mason tiling mason

5. Marble mason 6. Mason helper.

RCC Steel Work

1. Rebar fabricator

2. Rebar helper

Electrical works

1. Electrician

2. Cable jointer

3. Cable layer

4. Electrical helper

Plumbing and Sanitary Works

1. Plumber

2. Pipe fitter

3. Plumber helper

4. Unskilled Workers

5. General helpers

Mechanical Trades

1. Fitter

2. Machinist

3. Welder

4. AC mechanic

5. Sheet fabricator

6. Diesel mechanic

7. Auto electrician

8. Diesel mechanic

9. Petrol mechanic

10. Mechanic helper

11.Riggers

Drivers and Operators

1. Light vehicle drivers

2. Heavy vehicle drivers

3. Equipment operators

3 b) Describe wages and statutory requirement applicable to construction industry?

Ans: Construction workers constitute one of largest categories of workers in the unorganised sector. The workers are hired as and when required and are retrenched on completion of the work. Construction labour leads a migratory life working on different sites. The economic conditions of construction labour is the worst on account of their poor bargaining power, illiteracy and the temporary nature of their employment.

Construction workers have no job security and are last trained. Although industrial training institutes have been set up in our country, their contribution towards training of construction workers is not enough. Construction workers are paid very low wages.

There are two methods of making wage payment to labour, namely the time rate system and the piece rate system. In the time rate system, a suitable rate of payment is fixed per unit of time for which labour is engaged on the work. In the piece rate system, payment is based on output or production of the work. In this system, payment is made at the agreed rate· for the actual quantum of work carried out by each labourer.

A number of trade unions are connected with the construction industry. These trade unions include the following:

1. All India Trade Union Congress (AITUC)

2. Indian National Trade Union Congress (INTUC)

3. Bhartiya Mazdoor Sangh (BMS)

4. United Trade Union Congress (UTUC)

5. Hind Mazdoor Sabha (HMS)

6. Centre of Indian Trade Unions (CITU)

The main provisions of the Minimum Wages Act 1948 are as follows:

Different minimum rates of wages may be fixed for:

a) different classes of work in the same scheduled employment,

b) adults, children and apprentices,

c) different states and different localities.

In fixing minimum rates of wages, advisory committees are set up which collect detailed information such as the cost of living index on which the minimum wage is based.

If an employee is employed on any day for a period less than the required number of hours constituting a normal working day by the employer, he shall be entitled to receive a full day's salary except when the employee is unwilling to work for the full period.

The minimum wages under this Act shall be paid in cash.to the employees with due notification.

Every employer shall maintain a register indicating particulars of employees, wages paid to them and receipts given by them etc.

The appropriate Government may employ suitable persons as Inspectors for the purposes of this Act.

The Workmen's Compensation Act of 1923, as amended in 1948, provides for payment of compensation to workmen for injury by accidents sustained during the course of employment. The Act covers· workers employed in hazardous jobs but does not include clerical and administrative staff.

The Contract·

Labour (Regulations and Abolition) Act of 1970, as amended in 1986, was enacted with the object of regulating the employment of contract labour in certain establishments and providing for abolition 9f contract labour in certain circumstances. The Act incorporates provisions for improving the condition of contract labour. The Act is of special importance to the construction industry wherein works are generally executed on contract basis involving contract labour.

4 a). How construction equipment classified according to function?

Ans: CONSTRUCTION EQUIPMENTS

Construction equipment’s are one of the very important resources of modem construction, especially in infrastructure projects. Such projects utilize equipment’s for most of the works including earthmoving operations aggregate production, concrete production and its placement, and so on. In fact, one cannot think of any major construction activity without the involvement of construction equipment. There are different types of construction equipment’s suitable for different activities in a construction project. The choice of construction equipment defines the construction method, which in a way leads to the determination of time and cost for the project. In order to select the right equipment to perform a specific task at the least cost, it is essential to know the features of a construction equipment including its rate of production and the associated cost to operate the equipment.

Plant, equipment, and tools used in construction operations are priced in the following three categories in the estimate:

a) **Small tools and consumables:** Hand tools up to a certain value together with blades, drill bits, and other consumables used in the project are priced as a percentage of the total labour price of the estimate.
b) **Equipment usually shared by a number of work activities:** These kinds of equipment items are kept at the site over a period of time and used in the work in progress.
c) **Equipment used for specific tasks:** These are capital items and used in projects such as digging trench or hoisting material into specified slots. This equipment is priced directly against the take-off quantities for the project it is to be used on. The equipment is not kept-on-site for extended periods like those in the previous classification, but the equipment is shipped to the site, used for its particular task, and then immediately shipped back to its original location

CLASSIFICATION OF CONSTRUCTION EQUIPMENTS

Earthwork Equipment

a) Earth cutting and moving equipment: Bulldozers, Scrapers, Front-end loaders, Motor graders.

b) Excavation and lifting equipment: Backhoes, Power Shovels, Draglines, Clamshells.

c) Loading equipment: Loaders, Shovels, Excavators.

d) Transportation equipment: Tippers, Dump Trucks, Scrapers, Conveyors.

e) Compacting equipment: Tamping Foot Rollers, Smooth Wheel Rollers, Pneumatic Rollers, Vibratory Rollers, Plate Compactors

Concreting Plant and Equipment

a) Production equipment: Batching Plants, Concrete Mixer

b) Transportation equipment: Truck mixers, Concrete dumpers

c) Placing equipment: Concrete pumps, Conveyors, Hoist, Grouting equipment.

d) Concrete vibrating equipment: Needle vibrators, Plate compactors.

Material Hoisting Equipment

a) Hoists: Fixed, Mobile, Fork-lifts.

b) Mobile Cranes: Crawler-mounted, self-propelled rubber-tired, truck mounted.

c) Tower Cranes: Stationary, Travelling type.

Special Purpose Heavy Construction Plant and Equipment

a) Aggregate production equipment: Crushing plants, Rock blasting equipment, Screening plants.

b) Concrete paving equipment: Concrete paver finishers.

c) Pile driving equipment: Pile driving hammers.

d) Asphalt mix production and Placement equipment: Asphalt plants, asphalt pavers.

e) Tunnelling equipment: Drill jumbos, Muck-hauling equipment, Rock bolters, Tunnel boring machines.

4 b) Discuss the material management functions and inventory management?

Ans : MATERIAL MANGEMENT

Material management is the management system for planning and controlling all efforts necessary to ensure that the correct quality and quantity of materials are specified in a timely manner, obtained at a reasonable cost, and available at the point of use when required. Materials management can also be defined as "the function responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling manner so as a pre-decided service can be provided at a minimum cost"

Objectives and Functions of Materials Management

♣ Efficient materials planning

♣ Buying or Purchasing

♣ Procuring and receiving

♣ Storing and inventory control

♣ Supply and distribution of materials

♣ Quality assurance

Secondary Objectives of Materials Management

¬ Efficient production scheduling

¬ To take make or buy decisions

¬ Prepare specifications and standardization of materials

¬ To assist in product design and development

¬ Forecasting demand and quantity of materials requirements

¬ Quality control of materials purchased

¬ Material handling

¬ Use of value analysis and value engineering

¬ Developing skills of workers in materials management

¬ Smooth flow of materials in and out of the organization.

Importance of Materials Management

♣ Lower prices for material and equipment.

♣ Faster inventory turnover.

♣ Continuity of supply.

♣ Reduced lead time.

♣ Reduced transportation cost.

♣ Less duplication of efforts.

♣ Elimination of bulk- passing.

♣ Reduced materials obsolescence.

♣ Improved supplier relationship and better records and information.

♣ Better inter -department cooperation and Personnel development

INVENTORY MANAGEMENT

Inventory is simply a stock, of physical assets having some economic value which can be either in the form of material, money or labour. Inventory is also known as an idle resource as long as it is not utilised. Inventory may be regarded as those goods which are procured, stored and used for day-to-day functioning of the organisation.

Inventory control is the technique of maintaining stock items at desired levels. In other words, inventory control is the means by which material of the correct quality and quantity is made available as and when it is required with due regard to economy in the storage costs, ordering costs, set up costs, manufacturing costs, purchase prices and working capital.

There are following three main issues involved in inventory management and control

¬ How and what to prioritize for procurement'?

¬ How much to order?

¬ When to order?

Objectives of Inventory Control

As inventory is an essential part of any organisation, it consists of many items running into thousands. Systematic management and control of inventory for all the items is a challenging job.

¬ To maintain the overall investment in inventory at the lowest level, consistent with operating requirements,

¬ To supply the product - raw material, sub-assemblies, semi-finished goods, etc.

¬ To its users as per their requirements at right time and at right price,

¬ To keep inactive, waste, surplus, scrap and obsolete items at the minimum level,

¬ To minimise holding, replacement and shmtage costs of inventories and maximise the efficiency in production and distribution, and

¬ To reduce the risk inherent in treating inventory as an investment which is risky. For some items, investment may lead to higher returns and for others less returns

Factors affecting Inventory

(a) Selling Price
(b) Procurement Costs
(c) Shortage (or Stock out) Costs
(d) Delivery Lag or Lead Time.

5. Define quality of construction. Explain about total quality management?

Ans: Quality definitions

➢ It is the fitness for purpose.
➢ It is conformance to specification.
➢ It is about meeting or exceeding the needs of the customer. It is value for money.
➢ It is customer satisfaction/customer delight.
➢ It is doing it right the first time and every time.
➢ It is reduction of variability.

TQM has developed in many countries and it has helped organizations in achieving excellent performance, particularly in customer and business results. The quality movement is now gradually moving towards the much wider 'business excellence' or `Excellence' model.

Total Quality Management

Total quality management is accomplished through an integrated effort among all levels in a company to increase customer satisfaction by continuously improving current performance. TQM is a management-led approach applicable in all the

operations of a company and the responsibility of ensuring quality is collective. The philosophy of TQM is one of prevention rather than defect detection.

Management commitment and leadership

i. Training
ii. Teamwork
iii. Statistical Methods
iv. Cost of Quality
v. Supplier Involvement.

Construction, being different from manufacturing and other industries, has many unique problems that cause hindrances in adoption of TQM.

Some of the major problems identified are:

1. Lack of teamwork

2. Poor communication

3. Inadequate planning and scheduling

1. No team-building exercises at the inception of projects

2. Lack of understanding of team members' expectations

3. Little or no team-oriented planning and scheduling

5 b) Describe importance of safety in construction with examples?

Ans: Importance of Safety in Construction

Safety in Construction is a prime requirement but it is often neglected on work site. The range of construction and building activities involving complex techniques have led to many new problems of safety measures at site, resulting in a better work environment, higher productivity and greater contentment among workers

Safety Measures for Excavation

i. Prior to excavation work, a complete knowledge of underground structures such as sewers, wastepipes, gas mains etc. is essential so as to proper precaution to prevent any accidents.
ii. The workers must be provided with all protective devices.
iii. When depth of excavation exceeds 2 m, the trenches should be securely shored and timbered.

iv. Sheathing should be placed against the side of the trench. In case of loose or soft soil, sheathing should be driven into the bottom of the trench.

iv. Excavated materials should be kept away from the edge of the trench.

v. Heavy equipment such as excavating machineries, trucks etc. should be kept away at a suitable distance from the excavated sides.
vi. A fence or barricade should be erected and at night the area must be properly lighted.

Safety during Excavations

(A) An Open Excavation - Earth and Rock
(B) Tunnel and Shaft Excavation

Explosives, Drilling and Blasting

1. All operations involved in transportation, handling, storage and use of explosives should be as per Indian Explosive Act.

2. Explosive shall be handled by or under the supervision of competent and experience persons

3. Transport and Handling

4. Storage

5. Drilling

6. Loading

7. Blasting

Safety Measures for Scaffolding, Ladders, Formwork and Other Equipments.

i. All scaffolds and working platforms should be securely fastened to the building or structure. Of independent of a building, they should be braced or guys properly.
ii. In case, scaffolds are to be kept for a long period, a regular plank stairway, wide enough to allow two persons to pass, should be erected with handrails on both sides.
iii. When work is being carried out over a scaffold platform, a protective overhead covering should be provided for the men working on the scaffold.

iv. All wooden ladders or bamboo ladders must be strong enough.

iv. Ladders in heavy duty work should not exceed 6 m in length, for light work it should not exceed 8 m in length. vi. Dismantling of scaffold should be in a proper sequence.iNo un-insulated electric wires should exist within 3 m of working platform.
vii. The supporting ballast should be individually strong and properly braced and fastened.
viii. All persons handling construction equipment should be fully acquainted with the safety aspects of the machines and their operation. Detailed references made be made to IS: 3696 (part I & II) - 1966.

6 a) Define the following

i)Ethics: Engineering ethics is 1. The study of the moral issues and decisions confronting individuals and organizations engaged in engineering. 2. The study of related questions about the moral ideals, character, policies and relationships of people and corporations involved in technological activity.

Senses of Engineering Ethics

The word “ethics” (like the word “morals”) has several distinct although related meanings. Corresponding to them are various additional senses of the expression “engineering ethics”.

the word “ethics” is used to refer to the particular set of beliefs, attitudes and habits that a person or group displays concerning morality. This third sense of “engineering ethics” is a purely factual matter about what engineers and others believe about moral problems in engineering. It is a usage in which social scientists especially might be interested, since they seek to observe, describe, and explain beliefs and actions related to morality

ii)Morals: An engineered product or project goes through various stage of conception, design, and manufacture, followed by testing, sales and service. Engineers carry out or supervise the appropriate activities at whatever stage of this process a convenient division of labour has assigned them. The nature of the activity or project will generally dictate whether the engineers involved are civil, electrical, mechanical, or chemical engineers, to name only a few of the major branches of engineering. Engineers from the different branches or engineering departments may be grouped together in teams, or they may be isolated from each other but with some form of liaison among them.

The following four specific examples touch on a few of the areas covered by engineering ethics:

1. An inspector discovered faulty construction equipment and applied a violation tag, preventing its continued use. The inspector’s supervisor, a construction manager, viewed the case as a minor infraction of safety regulations and ordered the tag removed so the project would not be delayed. The inspector objected and was threatened with disciplinary action.

2. An electric utility company applied for a permit to operate a nuclear power plant. The licensing agency was interested in knowing what emergency measures had been 41 established for human safety in case of reactor malfunction. The utility engineers described the alarm systems and arrangements with local hospitals for treatment. They did not emphasize that these measures applied to plant personnel only and that they had no plans for the surrounding population. ”That is someone else’s responsibility, but we don’t know whose,” they answered upon being questioned about this omission.

iii)Values and Integrity:

Moral integrity is the unity of character on the basis of moral concern, and especially on the basis of honesty. The unity is consistency among our attitudes, emotions, and conduct in relation to justified moral values.

In the sense just introduced, ethics is an activity and area of inquiry. It is the activity of understanding moral values, resolving moral issues, and justifying moral judgments, as well as the discipline or area of study

resulting from that activity. Engineering ethics, accordingly, is the activity and discipline aimed at understanding the moral values that ought to guide engineering practice, resolving moral issues in engineering, and justifying moral judgments, concerning engineering.

6 b) Explain Professional duties and Professional and Indivdual rights?

Ans: Professional Duties

1. Engineers shall be guided in all their professional relations by the highest standards of integrity.

a. Engineers shall admit and accept their own errors when proven wrong and refrain from distorting or alternating the facts in an attempt to justify their decisions.

b. Engineers shall advise their client or employers when they believe a project will not be successful.

c. Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside employment, they will notify their employers.

d. Engineers shall not attempt to attract an engineer from another employer by false or misleading pretences. e. Engineers shall not actively participate in strikes, picket lines, or other collective coercive action.

f. Engineers shall avoid any act tending to promote their own interest at the expense of the dignity and integrity of the profession.

2. Engineers shall at all times to strive to serve the public interest.

a. Engineers shall seek opportunities to be of constructive service in civic affairs and work for the advancement of the safety, health and well-being of their community.

b. Engineers shall not complete, sign or seal plans and/ or specifications that are not of a design safe to the public health and welfare and in conformity with accepted engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.

c. Engineers shall endeavour to extend public knowledge and appreciation of engineering and its achievements and to protect the engineering profession from misrepresentation and misunderstanding.

3. Engineers shall avoid all conduct or practice which is likely to discredit the profession or deceive the public.

a. Engineers shall avoid the use of statements containing a material misrepresentation of fact or intended or likely to create an unjustified expectations; statements containing prediction of future success; statements containing an opinion as to the quality of the Engineer's services; or statements intended or likely to attract clients by the use of showmanship, puffery or self-laudation, including the use of slogans, jingles or sensational language or format.

b. Consistent with the foregoing, Engineers may advertise for recruitment of personnel.

c. Consistent with the foregoing, Engineers may prepare articles for the lay or technical press, but such articles shall not imply credit to the author for work performed by others.

Professional Rights

Engineers have several types of moral rights, which fall into the sometimes overlapping categories of human, employee, contractual and professional rights. As human beings, engineers have fundamental rights to live and freely pursue their legitimate interests. In particular, they have a human right to pursue their work and not to be unfairly discriminated against in employment on the basis of sex, race or age.

As employees, engineers have special rights, including institutional rights that arise from specific agreements in the employment contract. For example, there is the right to receive one's salary and other company benefits in return for performing one's duties

Basic Right of Professional Conscience

Institutional Recognition of Rights

Specific Rights: Recognition and Conscientious Refusal

Right of Conscientious Refusal

Right to Recognition

Employee Rights

Employee rights are any rights, moral or legal, that involve the status of being an employee.

Employee rights are:

i. The organization will not also discriminate against an employee for engaged in outside activities or for objecting to an organization directive that violates common norms of morality.
ii. The employee will not be deprived of any enjoyment of reasonable privacy in his/her workplace.
iii. No personal information about employees will be collected or kept other than what is necessary to manage the organization efficiently and to meet the legal requirements.

iv. There should be no discrimination against an employee for criticizing ethical, moral or legal policies and practices of the organization.

iv. No employee who alleges her/his rights have been violated will be discharged or penalized without a fair hearing by the employer organization.

7 a) Explain the principles of Engineeing Economics ?

Ans: Economics is the science that deals with the production and consumption of goods and services and the distribution and rendering of these for human welfare. The following life the economic goals

• A high level of employment

• Price stability

• Efficiency

• An equitable distribution of income

• Growth

PRINCIPLES OF ENGINEERING ECONOMY

The following are seven principles of Engineering Economics.

Principle 1 : Develop the alternatives

The choice (decision) is among the alternatives. The alternatives are to be identified and then defined for subsequent analysis. A decision situation involves making a choice among two or more alternatives. Developing and defining the alternatives for direct evaluation is important because of the resulting impact on the quality of the decision.

Principle 2: Focus on the differences

Only the difference in expected future outcomes among the alternatives is relevant to their comparison and should be considered when making the decision. If all prospective outcomes of the feasible alternatives were exactly the same, then there would be no basis or need for comparison. We would be indifferent to the alternatives and make decision on the basis of random selection.

Principle 3: Use a consistent viewpoint

The prospective outcomes of the alternatives, economic and other, should be consistently developed from a defined viewpoint (perspective). It is important that the viewpoint for a particular decision be first defined and then used consistently in the description, analysis and comparison of the alternative.

Principle 4: Use a common unit of measure

Using a common unit of measurement to enumerate as many of the prospective outcomes as possible will make easier the analysis and comparison of alternatives.

Principle 5: Consider all relevant criteria

Selection of a preferred alternative (decision-making requires the use of a criterion or several criteria). The decision process should consider both the outcomes enumerated in the monetary unit and those expressed in some other unit of measurement made explicit in a descriptive manner.

Principle 6: Make uncertainty explicit

Uncertainty is inherent in projecting for estimating the future outcomes of the alternative recognized m their analysis and comparison.

Principal 7: Revisit your decision

Improved decision-making results from an adoptive process. To the extent practicable, the projected outcomes of the selected alternative should he subsequently compared with the actual results achieved

o Problem recognition, definition and evaluation

o Development of feasible alternatives

o Development of cash flow for each alternative

o Selection of criteria o Analysis and comparison of the alternatives

o Selection of the preferred alternative

o Performance monitoring and post-evaluation results.

7 b) Explain problem solving and decision making in engineering economics?

Ans: PROBLEM SOLVING AND DECISION MAKING

An engineering economist draws upon the accumulated knowledge of engineering and economics to fashion and employ tools to identify a preferred course of action. There is still considerable debate about their theoretical bases and how they should be used. There are many aspects to consider and many ways to consider them.

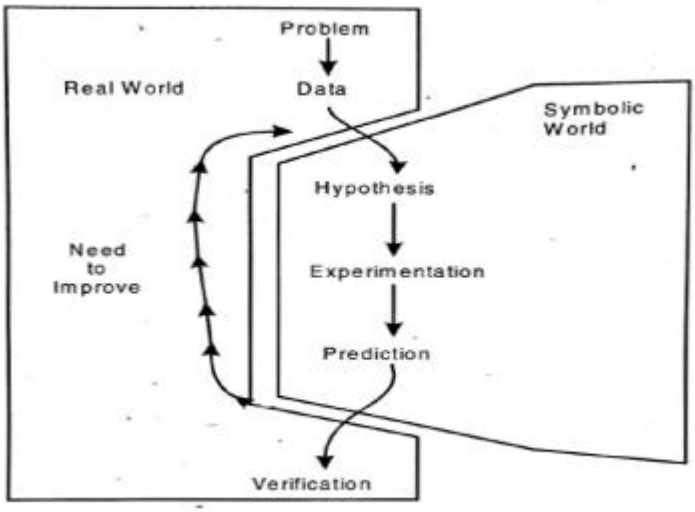


Fig. 4.1. Problem solving process

The fundamental approach to economic problem solving is to elaborate on the time honoured scientific method.

The method. is anchored in two worlds: the real, everyday working world and the abstract, scientifically oriented world as shown in Fig. 4.1.

Problems in engineering and managerial economy originate in the real world of economic planning, management, and control. The problem is confined and clarified by data from the real world. This information is combined with scientific

principles supplied by the analyst to formulate a hypothesis is symbolic terms. By manipulating and experimenting with the abstractions of the real world, the analyst can simulate multiple configurations of reality that otherwise would be too costly on too inconvenient to investigate.

From this activity a prediction usually emerges. The predicted behaviour is converted back to reality for testing in the form of hardware designs, or commands. If it is valid, the problem is solved. If not, the cycle is repeated with the added information that the previous approach was unsuccessful.

8 Explain in brief with interest formula for different type of

Ans : i) Single payment:

1) Single-payment compound amount

Here, th.e objective is to find the single future sum (F) of the initial payment (P) made at time O after n periods at an interest rate i compounded every period. The cash flow diagram of this situation is shown in Fig. 4.3

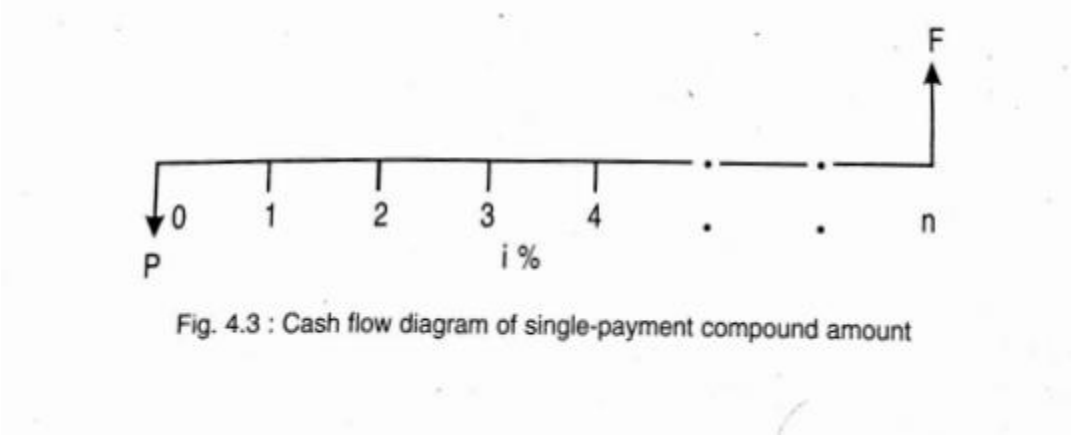


Fig. 4.3 : Cash flow diagram of single-payment compound amount

The formula to obtain the single-payment compound amount is

F = P(I + i)" = P(FIP, i, n)

where

(FIP, i, n) is called as single-payment compound amount factor.

2) Single-Payment Present Worth Amount

Here, the objective is to find the present worth amount (P) of a single future sum (F) which will be received after n periods at an interest rate of i compounded at the end of every interest period. The corresponding cash flow diagram is shown in Fig. 4.4.

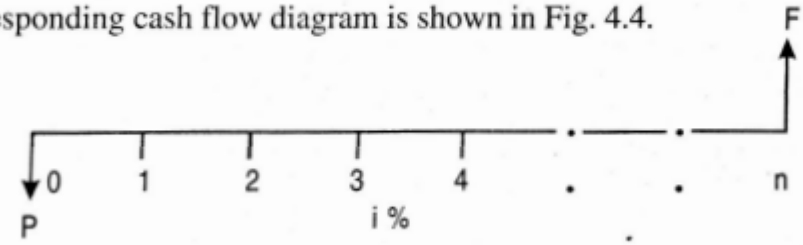


Fig. 4.4 : Cash flow diagram of single-payment present worth amount

The formula to obtain the present worth is

$$P = \frac{F}{(1+i)^n} = F(P/F,i,n)$$

where

$(P/F, i, n)$ is termed as single-payment persent worth factor.

EQUAL PAYMENT

Equal-Payment Series Compound Amount In this type of investment mode, the objective is to find the future worth of n equal payments which are made at the end of every interest period till the end of the nth interest period at an interest rate of i compounded at the end of each interest period. The corresponding cash flow diagram is shown in Fig. 4.5.

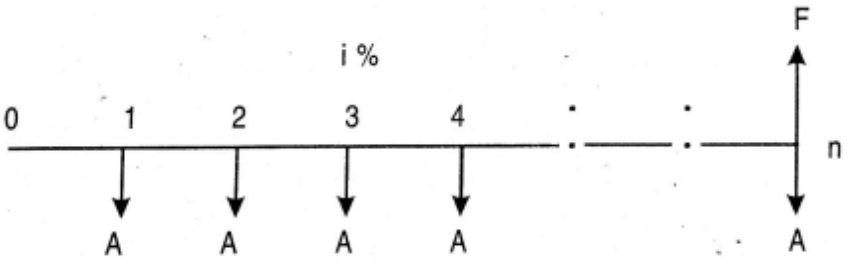


Fig. 4.5 : Cash flow diagram of equal-payment series compound amount

In Fig. 4.5,

A = equal amount deposited at the end of each interest period

n = No. of interest periods

i = rate of interest

F = single future amount

The formula to get F is

$$F = A\frac{(1+i)^n - 1}{i} = A(F/A,i,n)$$

Equal-Payment Series Sinking Fund

In this type of investment mode, the objective is to find the equivalent amount (A) that should be deposited at the end of every interest period for n interest periods to realize a future sum (F) at the end of the nth interest period at an interest rate of i. The corresponding cash flow diagram is shown in Fig. 4.7.

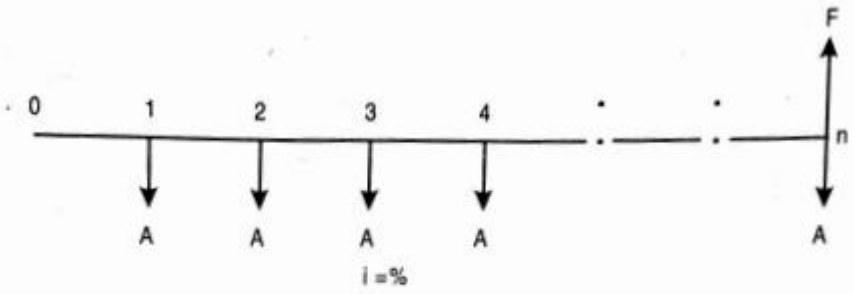


Fig. 4.7 : Cash flow diagram of equal-payment series compound amount

In Fig. 4.7,

A = equal amount to be deposited at the end of each interest period

n = No. of interest periods

i = rate of interest

F = single future amount at the end of the n^{th} period

The formula to get F is

$$A = F\frac{i}{(1+i)^n - 1} = F(A/F, i, n)$$

where

$(A/F, i, n)$ is called as *equal-payment series sinking fund factor.*

Equal-Payment Series Present Worth Amount

The objective of this mode of investment is to find the present worth of an equal payment made at the end of every interest period for n interest periods at an interest rate of i compounded at the end of every interest period.

The corresponding cash flow diagram is shown in Fig. 4.9. Here,

P = present worth

A = annual equivalent payment

i = interest rate

n = No. of interest periods

The formula to compute P is

$$P = A\frac{(1+i)^n - 1}{i(1+i)^n} = A(P/A,i,n)$$

where

$(P/A, i, n)$ is called *equal - payment series present worth factor.*

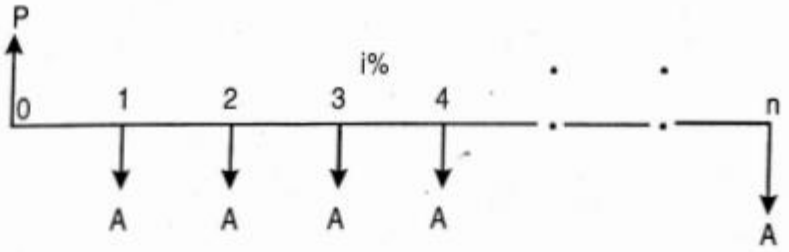


Fig. 4.9 : Cash flow diagram of single-payment series present worth amount

Equal-Payment Series Capital Recovery Amount

The objective of this mode of investment is to find the annual equivalent amount (A) which is to be recovered at the end of every interest period for n interest periods for a loan (P) which is sanctioned now at an interest rate of i compounded at the end of every interest period (Fig. 4.10).

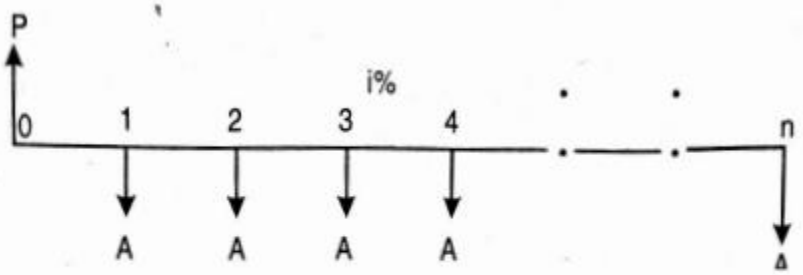


Fig. 4.10 : Cash flow diagram of equal-payment series present recovery amount

In Fig. 4.10,

P = present worth (loan amount)

A = annual equivalent payment (recovery amount)

i = interest rate

n = No. of interest periods

The formula to compute A is as follows:

$$A = P\frac{i(1+i)^n}{(1+i)^n - 1} = P(A/P,i,n)$$

where

$(A/P, i, n)$ is called *equal - payment series capital recovery factor.*

UNIFORM GRADIENT SERIES

Uniform Gradient Series Annual Equivalent Amount

The objective of this mode of investment is to find the annual equivalent amount of a series ~ with an amount A 1 at the end of the first year and with an equal increment (G) at the end of each ; of the following n - 1 years with an interest rate i compounded annually,

~ The corresponding cash flow diagram is shown in Fig. 4.11.

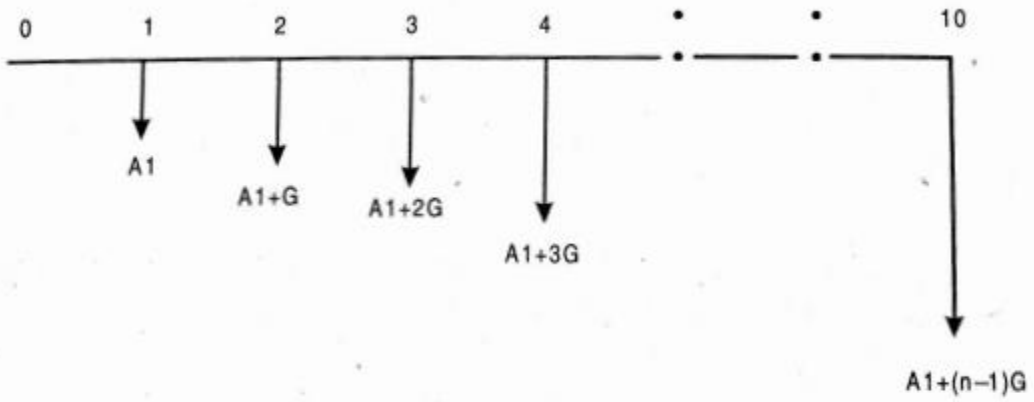


Fig. 4.11 : Cash flow diagram of equal-payment series sinking fund

The formula to compute A is

$$A = A1 + G\frac{(1+i)^n - in - 1}{i(1+i)^n - i}$$

$$= A1 + G(A/G, i, n)$$

where

$(A/G, i, n)$ is called *uniform gradient series factor.*

9 a) Define micro , small and medium enterprise (MSME). What are the characteristise of MSME?

Ans: MICRO, SMALL & MEDIUM ENTERPRISES (MSME)

Definition of MSMEs usually take into consideration the total assets, the level of turnover and the number of employees of the firm.

In India, the enterprises have been classified broadly into two categories:

• Manufacturing; and

• Those engaged in providing / rendering of services

Both categories of enterprises have been further classified into micro, small and medium enterprises based on their investment in plant and machinery (for manufacture enterprises) or on equipment's (in case of enterprises providing or render ng services). The present ceiling investment to be classified as micro, small or medium enterprises is as under:

Classification	Investment Ceiling for Plant, Machinery or Equipments *@	
	Manufacturing Enterprises	Service Enterprises
Micro	Upto ₹ 25 lakh ($50 thousand)	Upto ₹ 10 lakh ($20 thousand)
Small	Above ₹ 25 lakh ($50 thousand) and Upto ₹ 5 crore ($ 1 million)	Above ₹ 10 lakh ($20 thousand) and upto ₹ 2 crore ($0.40 million)
Medium	Above ₹5 crore ($1 million) and upto ₹ 10 crore ($2 million)	Above ₹2crore ($0.40 million) and upto ₹ 5 crore ($1 million)

ROLE OF MSME IN ECONOMIC DEVELOPMENT

Micro, small and medium enterprises play a significant role in nation 's development through high contribution to domestic production, significant export earnings, low investment requirements, operational flexibility and indigenous technology. For these reasons Indian small and medium enterprise sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades.

The role of micro, small and medium businesses in the economic development of a nation is as discussed

i) High contribution to domestic production
ii) Large employment opportunities
iii) Meet local requirements of larger businesses
iv) Environmentally friendly approach
v) Export earnings and import substitution
vi) Supporting the idea of inclusive growth

Characteristics of entrepreneurship

1. Innovation: Entrepreneurship involves innovation of new things to effect dynamic changes & good success in economy. It should create conditions for growth of economy

2. Risk – taking: Risk is an inbuilt element of any business. An entrepreneur, however, prefers to take calculated risks, ploughs back in business, takes small steps to grow, make sustained profits and moves on.

3. Skilful management: Entrepreneurship hinges together various functions of the management planning organizing staffing directing controlling & leading.

4. Organization: It being together various facilities of production for an efficient & economical use.

5. Decision making: Decision making is very vital. Taking decision at all levels & stages of entrepreneurship is a routine task.

6. Making the enterprise a success: It is mainly an economic activity as it deals with creating & operating an enterprise. It involves in satisfying the needs of customers with the help of production and distribution of goods & services.

9 b) What is Entrepreneurship development? Explain in brief?

Ans: ROLE OF MSME IN ECONOMIC DEVELOPMENT

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iv) Environmentally friendly approach
v) Export earnings and import substitution
vi) Supporting the idea of inclusive growth

i) **High contribution to domestic production:** The SMEs play a significant role in nation development through high contribution to the gross domestic production. In India, these units are producing more than 8,000 products and contribute about 40 percent to the GDP. In this sense, in recent years the MSME sector has constantly registered higher growth rate compared to the overall industrial sector.

ii) **Large employment opportunities:** The MSME Sector, in terms of per unit of business employment figure may nor- appear to be a big employer. However, collectively the number of employment opportunities created by this sector, is notable. Also, while creating local job opportunities it helps mitigate problem that causes large scale migration of rural population to urban areas

iii) **Meet local requirements of larger businesses:** The micro, small and medium businesses are complementing to larger industries as ancillary units. The· local input requirements of bigger units for several raw, semi-finished and finished products are largely met by these locally based units.

iv) **Environmentally friendly approach:** The methods of production applied by micro, small and s are largely eco-friendly, thus, not damaging its basic elements, i.e., air, water and soil. The manufacturing techniques are simple and in most cases they do not require use of harmful substances quire use or heavy machines. Some of the

SMEs rather enrich the environment with their production processes. Organic farming, handmade paper production and manure making are few examples.

v) **Export earnings and import substitution**: The SMEs are making a huge contribution towards improving the balance of payment position and self-reliance. Their share in total exports stands at about 40 percent- with a massive production of more than 8000 products to the tune of about 18 lakh crore. There are more than 8,000 products ranging from traditional to high-tech items which are being manufactured by the Indian MSMEs. All this is helping Indian economy significantly in becoming self-reliant by cutting down on the list of import items.

vi) **Supporting the idea of inclusive growth:** Inclusive growth means equitable opportunities for economic participants during economic growth with benefits to every section of society. The micro, small and medium enterprises create employment opportunities, help kill development and encourage innovation. Thus, they promote inclusive development of a society. The National Programme on Skill Development and Entrepreneurship, 2015 is a major step in the direction of inclusive growth.

10 a) Write a short notes on roles and functions performed with respect to entrepreneurship:

Ans:

i) KAIDB : KARNATAKA INDUSTRIAL AREA DEVELOPMENT BOARD. This is a statutory body established in 1966 by government of Karnataka. Headquarters is at Bangalore with 9 zonal offices all over Karnataka.

Objectives:

a) To establish Industrial areas and promote rapid and orderly establishment of industries in the state of Karnataka

b) To provide infrastructural facilities and amenities to SSIs

c) To assist in implementation of government policies (iv) To function on 'No profit – No loss' basis.

Functions:

To acquire lands for industrial activity at identified and notified locations and form industrial area with all infrastructure facilities like road, electricity power, water supply

- To acquire lands in favour of single unit.
- To acquire lands for single unit complexes for government organizations and to facilitate government projects
- To provide all the infrastructure facilities to such industrial areas.
- To maintain the infrastructural facilities during the contractual project.

ii) TECSOK:

TECHNICAL CONSULTANCY SERVICES OF KARNATAKA. It was established in 1976 by the government of Karnataka. It is located in Basava Bhavan, Basaveshwara Circle, Banglore.

Nature of support: Multi-disciplinary technical, industrial and management consultancy.

Objectives:

a) To provide reliable consultancy support for entrepreneurs to startup self-employment ventures in Karnataka.

b) To provide consultancy services to the various Departments and Agencies of state and Central Governments.

Functions:

- To identify investment opportunities which are location specific.
- To assist entrepreneurs in obtaining statutory and procedural clearances.
- To carry out feasibility studies and environmental impact studies.
- To assist preparation of detailed project reports as per investment norms and financial norm.
- To carry out market survey and research specific to industry needs.
- To assist in project implementation and extend turnkey assistance.
- To help in reorganization and restructuring of employees.
- To diagnose sick units and suggest rehabilitation measures
- To provide consultancy in valuation of assets, manpower, planning and budgetary control system
- To promote consultancy for merges and take overs.

iii) SIDBI

SMALL INDUSTRIES DEVELOPMENT BANK OF INDIA. It was established in 1990 under Act of Indian Parliament as a principal financial institution. It is a subsidiary of IDBI. Its head office is in Lucknow. SIDBI is among the top 25 development banks in the world.

Nature of support: Financial services and other support services

Objectives:

(i) To promote, finance and develop small scale sector in India.

(ii) To co-ordinate the functions of other institutes engaged in similar activities

(iii) To finance industrial infrastructure projects.

Functions:

To provide finance assistance to a. new projects

b. expansion/diversification projects c. modernization projects

- To initiate steps for technological upgradation and modernization of existing units.
- To promote rural industrialization
- To provide channels for marketing SSI products in India and abroad.
- To foster Human Resource Development to suit the SSI sector needs
- To disseminate appropriate information to budding and existing entrepreneurs.

iv) DIC

- A Single Window Agency

DISTRICT INDUSTRIES CENTRE. Launched in 1978 in all districts of each state. There are about 400 DIC's in India.

Nature of support: Information and Consultancy Services. Industrial Inputs.

Objectives:

- To effectively promote cottage and small-scale industries in rural areas and small towns.

• To act as a Single Window Agency to help the entrepreneur with all the information under one roof.
• To serve as an integrated administrative frame work at the district level for industrial development.

Functions:

Surveys: To carry out surveys to assess the potential of a district with respect to industrial development taking into account availability of raw material, manpower, infrastructure, demand for a product etc. This survey provides a basis for advising budding entrepreneurs.

• Action Plan: To prepare an action plan for the industrial development of the district.
• Appraisal: To appraise various investment proposals received from entrepreneurs.
• Guidance: To guide entrepreneurs in selecting appropriate machinery and equipment.
• Marketing: To assist entrepreneurs in marketing their products and assess the possibility of export promotion.
• R&D: To link R&D institutes with entrepreneurial activities for product innovation.
• Training: To conduct artisan training programs.

10 b) What is project report? List salient features of project report?

Ans: Project report is a document which describes the progress at every stage of the project. The project report provides detailed information about the project which is used to fill up the form for obtaining the provisional SSI registration. Project report is also useful while applying for loans from financial institutions and for getting clearances from the government. But, while evaluating the profitability of various project ideas, an entrepreneur can prepare the project report for all such projects and can select the most profitable and technically sound project.

It acts as a guide to management, especially at the intimal stage to know whether the technical, commercial, financial and economic conditions are feasible or not.

Planning commission of India issued some guide lines for preparing/ formulating realistic project reports. The project formulation stage involves the identification of investment options by the enterprise and in consultation with the Administrative ministry the planning commission and other concerned authorities. The summery of the guidelines by planning commission are presented here

1. **General information:** The feasibility report must include the analysis of the industry to which it belongs. The report should deal with description of type of industry, its priority, past performance, increase in production, role of public sector, technology, allocation of funds and information about the enterprise.
2. **Preliminary Analysis of alternative:** The details like gap between demand and supply of proposed products, availability of capacity, list of all existing plants in industry, indicating their capacity, level of production attained, list of present projects and list of proposed projects. All technically feasible options are considered here.
3. **Project Description:** The feasibility report should provide a brief description of the technology/process selected for the project, information pertaining to the selection of optimal location, population, water. Land, environment, pollution and other environmental problems etc., are to be provided.
   The report should contain details of operational requirements of the plant, requirement of water, power, personnel, land, transport, construction details for plant and offices etc

4. **Marketing plan:** The details like marketing plan, demand, target price of product, distribution methods etc., are to be presented.
5. **Capital requirements and costs:** Information with regard to capital requirement and costs with breakup are to be provided. The estimates should be realistic and based on logical information
6. **Financial Analysis:** Financial analysis is essential to assess the financial viability of the project. A preformat balance-sheet, details of depreciation, clearance for foreign exchange, details of any income tax rebate, incentives for back work areas are to be included.
7. **Economic Analysis** Social profitability analysis is to be made. Impact of the operations on foreign trade, direct costs and benefits are to be included in the report.
8. **Miscellaneous aspects:** Depending upon the nature and size of operation of a particular project, any other relevant information may be included in the project report.