CBCS SCHEME

USN | | | | | | | | | | | BCV501

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Construction Management and Entrepreneurship

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	**a.**	Explain in detail construction project formulation.	**10**	**L2**	**CO1**
	b.	The activity data of a project is given below: Activity | Preceding activity | Duration (Days) A | - | 05 B | - | 15 C | - | 09 D | A | 06 E | C | 04 Draw the network diagram, identify the critical path, project duration and free float.	**10**	**L3**	**CO1**
		OR			
Q.2	**a.**	What is Work Breakdown Structure (WBS)? Mention its significance in construction project.	**10**	**L2**	**CO1**
	b.	Below given table pertains to the list of activities and their time estimates of a job: Activity | Event | Optimistic time (days) | Most likely time (days) | Pessimistic time (days) A | 1 – 2 | 3 | 7 | 10 B | 1 – 3 | 4 | 8 | 13 C | 2 – 4 | 2 | 2 | 07 D | 3 – 4 | 5 | 8 | 10 Draw the network and critical path. What is the expected completion time with the probability of 85%? (Take probability factor Z = 1.038)	**10**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	Discuss on Class of Labour. What are the key factors of minimum wages act 1948?	**10**	**L2**	**CO2**
	b.	List the factors affecting Labour productivity? Briefly discuss any three factors.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Enumerate the factors to be considered for selection of Construction Equipment.	**10**	**L2**	**CO2**
	b.	Explain material management and inventory management.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Explain types of procurement and procurement planning.	**10**	**L2**	**CO3**
	b.	Explain the sustainable procurement management.	**10**	**L2**	**CO3**
		OR			
Q.6	**a.**	Explain the different types of construction contracts.	**10**	**L2**	**CO3**
	b.	Define contractor and subcontractor. Explain the effective sub contractor management.	**10**	**L2**	**CO3**

		Module – 4			
Q.7	**a.**	Explain the process of construction project quality management.	**10**	**L2**	**CO4**
	b.	Explain the safety measures adopted during construction.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain Safety Management and Risk Management.	**10**	**L2**	**CO4**
	b.	Explain the terms: i) Facilities Management ii) Occupancy certificate	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the different characteristics of a Successful Entrepreneur.	**10**	**L2**	**CO5**
	b.	Explain 5M model and communication skills.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain the Business Planning process, Marketing Plan and Financial Plan.	**10**	**L2**	**CO5**
	b.	Explain the role and significance of venture capital.	**10**	**L2**	**CO5**

* * * * *

* Financial feasibility - can it be funded? what is the cost and return?
* Legal feasibility - Are there any regulatory or environmental constraints

3) Preliminary Project Report (PPR) -
* Prepares a basic layout of project scope investment required, ~~Project Scheduling (CPM/PERT), Risk assessment and funding Strategies~~, expected timeframe, key stakeholders.
* ~~Act as a Blue print for Project execution~~

4) Detailed Project Report (DPR) -
* includes architectural/structural plans, detailed cost estimates, Project Scheduling (CPM/PERT), risk assessment and funding Strategies
* Act as a Blueprint for project execution

5) Resources Planning -
* Estimate the required manpower, materials machinery, money and time
* Helps in procurement planning and scheduling

6) Site Selection and Survey -
* Analyze location in terms of accessibility, soil condition, availability of utilities and environmental impact.

* Risk Analysis -
  * Identify risks like cost overruns, delays labour issues, safety
  * Develop mitigation strategies

8) Environmental and Legal Clearances
  * Get necessary permits from local authorities (Eg pollution control, land use, zoning)

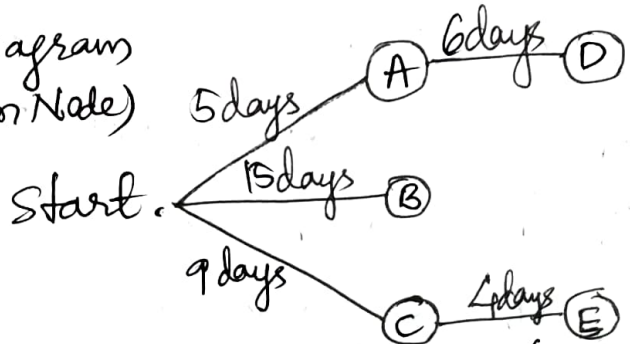
Q1.b) The activity data of a project is given below (10M)

Activity	Preceding Activity	Duration (Days)
A	—	5
B	—	15
C	—	09
D	A	06
E	C	04

Draw the network diagram, identify the Critical path, project duration and free float

Ans. Network Diagram

1) (Activity on Node)



Activities A, B and C start simultaneously

D follows A

E follows C.

2) Paths and Durations

All paths from start to End.

Path 1 A → D – End = 5 + 6 = 11 days.
Path 2 B (end) = 15 days
Path 3 C → E – End = 9 + 4 = 13 days

3) Critical Path – It is the longest Path through the network

Path 2 B → end is the longest Path 15 days
Critical Path = B
Project Duration = 15 days

4) Free Float Calculation
FF = earliest start of Next activity – earliest Finish of Current activity
We calculate FF for non-critical activities
Activity A (Precedes D)
A finishes at Day 5
D starts at Day 5 → So FF = 5 – 5 = 0
Activity C (Precedes E)
C finishes at Day 9
E Starts at Day 9 → So, FF = 9 – 9 = 0
Activity D.
D finishes at Day 11
No Successor → FF = 0
Activity E
E finishes at Day 13

NO Successor → FF = 2 (Because project ends at days 15.

Hence

Network diagram = A → D, C → E, B

Critical Path B

Project Duration = 15 days

Free Float = Only Activity E has Free float = 2 days.

OR.

Module - 1

Q2 a) What is Work breakdown structure (WBS) Mention its significance in Construction Project (10M)

Sol: The functional elements of a project and their interrelationship are determined by a Technique known as work breakdown structure. Such a techniques establishes the hierarchical order in a system by breaking the Project into recognizable systems, subsystems, discrete activities. The objective is to identify discrete activities or tasks that can be planned, estimated scheduled, executed and controlled for completion

Significance – purpose	Explanation
1) Scope	Clearly defines what work is included in the project, avoiding scope creep

2) Better planning — Helps in estimating time cost and resources more accurately

3) Task Assignment — Assigns specific tasks to teams, improving responsibility and accountability

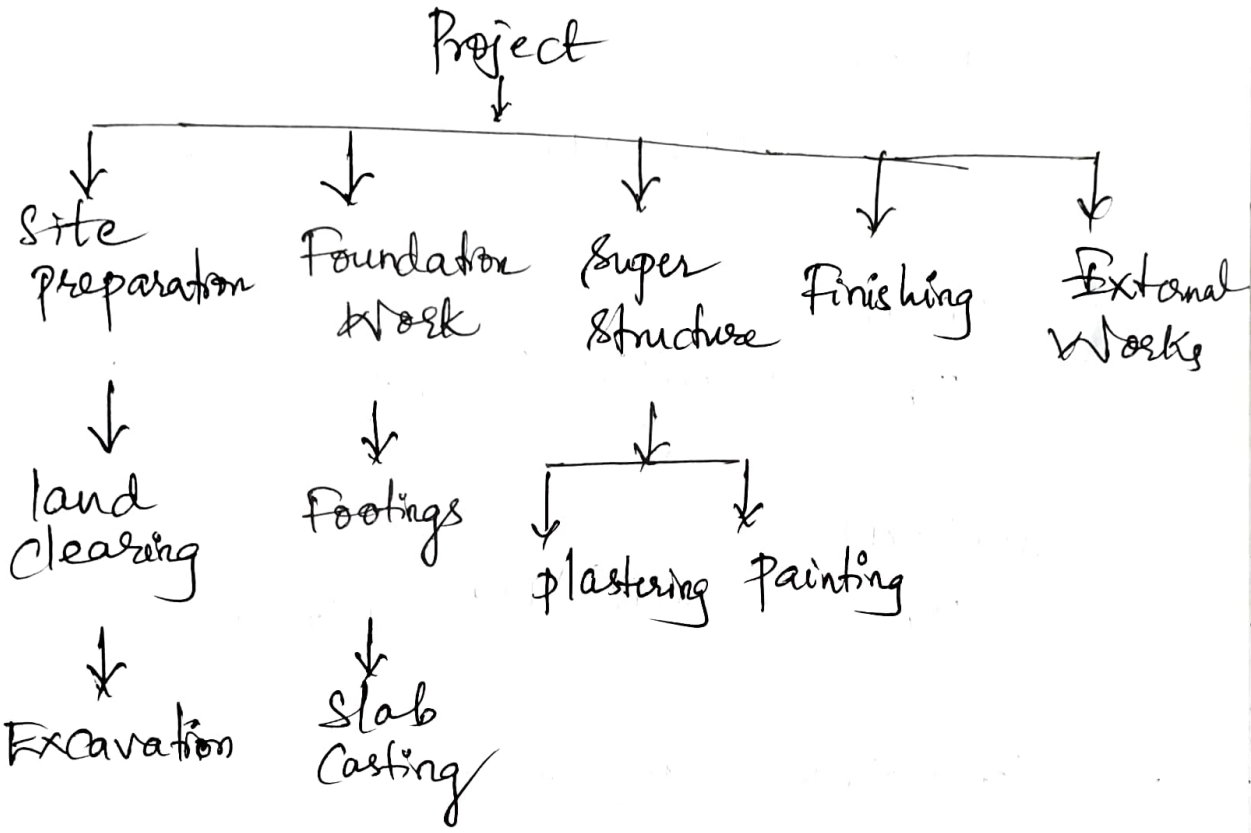
4) Progress Tracking — Makes it easier to monitor which part of the project is on track or delayed

5) Budget Management — Links costs to each task or work package, making cost control easier

6) Communication Tool — Provides a clear overview for all stakeholders - from engineers to clients

7) Risk Management — Helps in identify risks in individual components rather than at the whole Project level.

Hence WBS is essential for managing large construction projects by breaking them into logical Units of Work. It enhances control, communication, planning or performance tracking.



Q2 b.) Below given table pertains to the list of activities and their time estimates of a Job (10M)

Activity	Event	Optimistic time (days)	Most likely time (days)	Pessimistic time (days)
A	1-2	3	7	10
B	1-3	4	8	13
C	2-4	2	2	07
D.	3-4	5	8	10

Draw the Network and critical path. What is the expected completion time with the probability of 85% Take Probability factor $Z = 1.038$

Ans 1) Expected Time Calculation.

A (1-2)

$$TE = \frac{3+4(7)+10}{6} = 6.83$$

B(1-3)

$$TE = \frac{A+4(8)+13}{6} = \cancel{9.5}\ 8.17$$

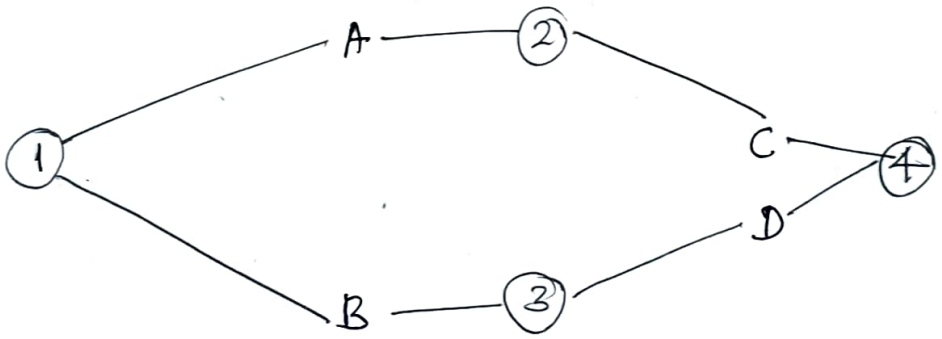
C(2-4)

$$TE = \frac{2+4(2)+7}{6} = 2.83$$

D(3-4)

$$TE = \frac{5+4(8)+10}{6} = \cancel{9.17}\ 7.83$$

2) Network Work diagram



Path 1 $A \rightarrow C = 6.83 + 2.83 = 9.66$ days

Path 2 $B \rightarrow D = 8.17 + 7.83 = 16$ days

Critical Path $B \longrightarrow D$

Project Duration = 16 days

3) Calculation of SD for critical path

(1) Varience $\sigma^2(B) + \sigma^2(D)$

$= (1.50)^2 + (0.83)^2$

$= 2.94$

(2) Standard Deviation (σ total) $= \sqrt{2.94} = 1.71$

4) Calculation of completion Time for 85% Probability

$$T = \mu + z.\sigma$$

$$= 16 + (1.038 \times 1.71) = 17.78 \text{ days}$$

where μ = Expected Time = 16

z = 1.038 for 85%

σ = 1.71

Result –

Critical Path	B → D (1 → 3 → 4)
Project Duration	16 days
Std. Dev. of CP.	1.71
Completion Time (85%)	17.78 days.

Module 2

Q3 a) Discuss on class of labour. What are key factors of minimum Wages act 1948? (10M)

Sol. Class of labour include – Direct labour, indirect labour. In indirect labour Unskilled and skilled labour, Semi Skilled labour

In – Dired labour :- The indired labour

labour covers all supervisors, staff and workers, It is required to support the direct manpower both technically and administra-tively. They are accounted on montly basis

Direct labour:— These are construction site workers who can be identified with execution of the client's permanent works, listed in the bill of quantities (BOQ) Direct Manpower consists of 70-85% of the total manpower, which is employed at the project site.

The direct construction workers, include formen and tradesmen, skilled in various engineering trades, in addition to the semi skilled and unskilled manpower. Tradesmen include Shuttering carpenters, fabricators, masons, plumbers, electricians, metal workers, painters and decor decorators. Accounts for workers The Wages of construction site workers are accounted on daily or monthly basis.

In direct labour - 1) Unskilled labour
2) Semi skilled labour
3) Skilled labour

Unskilled labour →
It refers to workers who possess no particular skills are likely have no formal education. This type of work usually involved simple duties that does nt

require judgment. But most of cases un-skilled labour requires to exert more physical strength. But due to technological advancements and demand for skills, unskilled labour in the construction industry will need to advance their skill-set.

semi-skilled labour →

They do not require advanced training or specialized skills, but it does require more skills than an unskilled labour job. The types of skills necessary for this are not complex, but include to monitor and perform repetitive tasks. These types of skills are more likely to be transferrable and useful in other jobs.

skilled labour →

It refers to workers who have specialized training or skills. The labours are capable of exercising judgement and have knowledge of the particular construction activity they are working on.

Key factors of the Minimum Wages Act 1948

1) Scheduled employment — Minimum wages are fixed only for those employments listed

in the schedule of the Act which can vary by state

2) Cost of living Adjustments (VDA) - wages may include a variable dearness allowance which varies based on the Consumer Price index (CPI) This keeps wages relevant to inflation and living standards.

3) Regional differences - Minimum wages may differ across state, regions or zones within a state based on cost of living industrial development and local conditions

4) Nature of Work - Different wages or rates can be fixed for Piece work, Overtime Work Time Work, Night shifts.

5) Employment type - Wages may differ for permanent workers, casual workers, contract workers, Daily wage earners.

6) Gender equality - Act prohibits discrimination in wages based on gender for the same or similar work.

7) Working Hours and Rest - It prescribes standard working hours (8hrs/day) and mandates one day rest per week.

8) Revision and Notification – Wages must be revised at least every 5 years.

9) Enforcement and Penalties – Labour inspector ensure compliance. Non payment or under payment can lead to legal penalties including fines and imprisonment

Q3 b) List the factors affecting Productivity Briefly discuss only three factors (10M)

Sol. Factors affecting productivity –

1) Overtime
2) Fatigue
3) Concurrent Operation
4) Mobilize/ Demobilize
5) Reassignment of Manpower
6) Start/stop
7) Site Access
8) Hazardous work area
9) Shorter daylight hours
10) Weather and season changes
11) Shift work
12) Tool and equipment shortage
13) Proximity of Work
14) Alternating, staggered or rotating work schedules.

1. Overtime – Scheduling of extended work days or weeks exceeding a standard work day or 40 hours work week lowers work output and efficiency through physical fatigue and poor mental attitude

2. Site Access – This is a result of interferences to the convenient or planned access to work areas. This can be due to blocked stairways roads, walkways, insufficient man lifts or congested work sites.

3. Sift Work – This is when work is performed at any time other than the first shift or the morning shift of a Work day. Work on second and third shifts are less efficient and may even be based on a shorter work period.

OR.

Q4 a) Enumerate the factors to be considered for selection of Construction equipment? (10M)

Sol. i) Economic Consideration – Economic considera-tion such as owning cost and operating cost of equipment are most important in selection of equipment. Besides, the resale value the replacement cost of existing equipment

and the salvage associated with equipment are also important.

2) Company specific - The selection of equipment for a company is governed by its policy on owning or renting. While emphasis on owning may result in purchase of equipment keeping in mind the future requirement of the project. The emphasis on renting may lead to putting too much focus on short term benefits.

3) Site Specific - Both ground and climatic conditions may affect the equipment selection decision. Eg Soil and profile of a site may dictate whether to go for crawler mounted equipment or wheel mounted equipment. Both climatic condition such as the presence of strong winds, visibility level and noise level may affect equipment selection decision.

4) Equipment Specific - Construction equipment come with high price tags while it may be tempting to go for the equipment with low initial price. It is preferable to opt for standard equipments, such equipments are manufactured in large numbers by the manufacturers and their spare parts of easily available. Also they can fetch good salvage money at the time of their disposal. The size of the equipment selected is also an important consideration.

5) Client and Project Specific – The client in a certain preferences that are not in line with the construction Companies preferred policies as far as equipment procurement is concerned.

6) Manufacturer Specific – A construction company may prefer to buy equipment from the same manufacturer again and again from a specific dealer. This may be to bring uniformity in the equipment possessed by the company or because the company in familiar with the working style of the manufacturer and the dealer.

7) Labour Consideration – Shortage of manpower in some situations may lead to bring uniformity in the decision in favour by procuring equipment i.e highly automated The selection of equipment may be governed by the availability or non availability of trained manpower.

Q4 b) Explain the material management and inventory management. (10M)

Sol. It refers to the whole range of goods and services that are purchased or procured from sources outside the organization and are

used to finish the given construction work.

A typical construction project requires a variety of Materials. Materials in a Project are classied under captical equipment, construction Machineries and consumables. Some companies classify their Materials under two categories Capital and revenue items. Plants and Machinery, vehicles, office equipment, land and buildings are placed under Capital items, while small and heavy tools, consumables, electrical items and construction materials are designated under revenue items.

The importance of material management can be gauged from the fact in any typical building project. The share of the material costs in the different heads is 55 percent, labour cost is 25 Percent and Petrol, oil and lubricants, overheads, Tax components and profits is 5 percent each Hence it plays a important place in Construction management

Inventory Management –

The problem of inventory management is of maintaining an adequate supply of something to meet an expected demand pattern for a given financial investment. This could be a raw materials, work in progress, finished products, or spares and other indirect materials. It is one of indicators of manage-ment effectiveness on the material

management front. Inventory turnover ratio (annual ratio) is an index of Business performance. It deals with the determination of optimal policies and procedures for procurement of commodities.

Module-3

(Q5.a) Explain type of Procurement and procurement planning (10M)

Sol. Procurement in construction Management refers to the process of acquiring goods, services, labour and other resources necessary for a construction Project.

Types of procurement in construction management -

There are several procurement methods used in construction, each suited to different types of projects and risk profiles. These terms vary in terms of responsibilities, risk distribution and how the project team collaborates

a) Traditional (Design-Bid-Build) Procurement
In this client hires a design team (eg architects engineers) to complete the design. Afterward the project is put out to tender when contractors bid for the construction work. The lowest bid often wins the contract.

b) Design and Build (CD&B) Procurement

In the design and build method, a single contractor is responsible for both the design and construction of the project the client hires a contractor or firm that handles both design and construction under a single contract

c) Management Contracting

In this procurement method, a construction manager is hired early in the project to manage the construction process, while the actual construction work is done by subcontractors.

d) Construction Management (CM)

This Method is similar to management contracting but gives the client more control. The construction manager acts as the client's representative, coordinating the work of different contractors but not taking on construction risks directly.

e) Public Private Partnership.

This procurement type is used for large infrastructure projects, where the public and private sectors collaborate to fund, design, build and sometimes operate the project.

The private sector takes on the responsibility of financing, designing, constructing and sometimes operating the project in exchange for long term payments or user fees

f) Integrated Project delivery (IPD)
This relatively new method promotes collaboration among all stakeholders, owners, designers, contractors right from the start of the project. A collaborative team is formed early in the project, working under a single contract to deliver the project together

(Q5b) Explain the sustainable procurement management. (10M)

Sol:- It refers to acquiring goods, services and materials in a way that meets project needs while minimizing environmental impact promoting social responsibility and ensuring economic efficiency. It goes beyond the traditional focus on price, quality and delivery timelines by incorporating sustainability into decision-making

Key Goals to sustainable procurement-
1) Environmental Protection

2) Economic Efficiency
3) Social Responsibility

* Sustainable Procurement Requirements or it is executed in Construction management

1) Identifying Sustainable procurement requirement - In this planning phase, sustain-ability objectives may be clearly defined It involves integrating Environmental, Social and economic sustainability into the projects goals and specifying these requirements in the procurement strategy.

2) Supplier Selection and Prequalification - Selecting Suppliers who align with sustain ability goals is critical. During the prequal-ification and tendering process, potential Suppliers are evaluated based on their ability to meet Environmental and social criteria, alongside traditional performance metrics

3) Sustainable Material selection - The choice of Construction Materials plays a significant role in sustainable procurement. Prioritizing ecofriendly materials that have a lower environmental

impact can make a construction project more sustainable.

4) Lifecycle Costing – Sustainable procurement focuses on lifecycle costing (LCC) which assesses the total cost of an asset over its entire life cycle, from initial purchase to operation, maintenance and disposal instead of focusing solely on the initial purchase price

5) Engaging Stakeholders and Promoting Transparency – Sustainable procurement requires collaboration between all stakeholders ie, clients contractors, suppliers and the local community. Open communication ensures that sustainability goals are shared and supported across the project team

6) Monitoring and reporting sustainability performance

Throughout the project's lifecycle, it's important to monitor and evaluate the sustainability performance of the procurement activities. This involves tracking key sustainability metrics and reporting them regularly to project stakeholders.

7) Circular economy and Waste Reduction – The construction industry generates a significant amount of waste sustainable procurement includes adopting principles of

Circular economy where materials are reused recycled or repurposed to minimize waste and resource depletion.

8) Sustainable logistics and Transportation — Transportation and logistics are significant contributors to the environmental impact of a construction project. Sustainable procurement involves reducing the carbon footprint associated with transporting materials, equipment and labour to the construction site.

OR

Q6a) Explain different types of construction contracts (10M)

Ans. Construction contract come in various forms each suited to different project requirement risk allocations, payment structures. Here are the primary types of construction contract commonly used in the construction industry:-

1) lump sum (fixed Price) Contract —
In a lump sum contract also known as a fixed price contract, the contractor agrees to complete the entire project for a specified fixed amount. This type of contract is ideal when the project scope and specifications are well defined at the outset

2) Cost plus Contract —
In a cost plus contract, the client agrees

to pay the contractor for all project related costs plus an additional fee for profit, which may be a percentage of costs or a fixed amount. This type of contract is common when the project scope is not fully defined at the beginning.

3. Time and Material (T&M) Contract –
Under a time and material contract the client pays the contractor based on the time worked (hourly or daily rates) and materials used. This type of contract is suitable for smaller projects or when the scope is uncertain.

4. Unit price Contract –
In a Unit price contract, the work is divided into units (Eg per square foot or per cubic yard) and the client pays based on the actual quantity of units completed. This contract type is often used when the exact quantities are uncertain, but unit prices can be agreed upon.

5. Design ~~based~~ Build Contract –
Design based build contract combine design and construction services into one agreement, with one party responsible for both. The contractor or build (design-build)

firm manages all design, engineering and construction services, providing a streamlined approach.

6) Integrated Project delivery (IPD) contract
In a integrated project delivery (IPD) Contract, all major stakeholders (clients, designers, contractor) etc collaborate and share risks and rewards based on project outcomes. This type of contract emphasizes teamwork and efficiency

7) Guaranteed Maximum Price (GMP) contract –
In a GMP contract, the contractor agrees to a maximum price for the project ensuring the client will not pay more than this amount even if costs increases. If the final cost is less than the GMP, saving may be shared between the contractor and client based on the contract terms.

Q6b) Define Contractor and Subcontractor. Explain the effective subcontractor management (10M)

Ans. A Contractor is an individual or company that is hired by a client (Owner) to execute a specific scope of work under a formal agreement or contract

The contractor is directly responsible to the client for delivering the project as per specifications, budget and schedule
Eg: A construction company hired to build a commerical building

Subcontractor is an individual or company hired by the main contractor to perform a specific portion of the work. Subcontractor work under the supervision and terms set by the main contractor, not the client directly
Eg: Electrical contractor, plumbing contractor HVAC installer hired by the main contractor

Effective Subcontractor management

* Effective efficient subcontractor management is essential to maintain quality, schedule and cost control in a project

▷ Prequalification and selection
* Check credentials - license, certifications safety records
* Evaluate experience - Similar past projects, specification. Specialization
* Financial stability - Ensure they can handle the workload cash flow issues.

2) Clear Contractual Agreements

* Define scope of work clearly (avoid overlaps and gaps)
* Set quality standards, materials specifications and codes to be followed
* Outlines payment terms, timelines and penalty clauses for delays

3) Communication & Coordination

* Regular progress meeting between Contractor and subcontractors,
* Use project management tools to track deadlines and deliverables.
* Keep documentation of all changes and instructions

4) Performance Monitoring

* Conduct periodic inspections for quality control
* Track progress against schedule using Gantt Chart or other tracking systems
* Maintain daily/Weekly progress reports.

5) Safety & Compliance

* Ensure subcontractors follow safety protocols
* Verify compliance with labour laws and insurance requirements.

6) Relationship Building
* Treat subcontractors as partners rather than just vendors
* Provide feedback - both positive and corrective
* Resolve disputes quickly to avoid delays

7) Payment Management
* Pay on time for completed milestones to maintain good working relationships.
* Link payment to quality and schedule adherence.

Module - 4

Q7a) Explain the process of construction project quality management. (10M)

Ans. Construction Project quality management (CPQM) is the process of ensuring that all project activities meet predefined quality standards so that the final product satisfies the client requirement complies with codes and perform reliably.

1) Quality planning - To identify the quality standards relevant to the project and plan how to achieve them.
Activities - Define quality objectives (eg. strength of concrete, tolerance, safety). select relevant standards/codes (Is code, Astm, Iso etc).

Prepare a quality management plan specifying procedures, responsibilities and inspection schedules.

2) Quality Assurance (QA) – Provide confidence that quality requirements will be fulfilled by preventing defects.
Activities – Implement process controls (Eg Proper curing methods, skilled labour deployment). Conduct training for workers on workmanship and safety. Perform audits to ensure compliance with the quality plan and to maintain documentation for traceability.

3) Quality Control (QC) – Verify that the completed work meets specifications by detecting and correcting defects.
Activities – Inspection and testing of Materials (cement, steel, aggregates etc) on site measurement for alignments, dimensions and finish. Non destructive testing (NDT) for concrete strength weld quality. Prepare inspection reports and take corrective actions if deviations occur

4) Continuous Improvement – Learn from project performance to improve future quality
Activities – Analyze non conformance reports. Update procedure to prevent recurrence.

conduct review meetings after project completion

5) Documentation & Handover – Complete quality records such as Material test certificates, inspection reports, compliance certificates. Submit to the client as part of project close out.

Q7b) Explain the Safety measures adopted during Construction. (IOM)

Ans. Construction site safety measures are procedure precautions taken to protect workers, ensure equipment and the public from accidents, injuries and hazards during construction activities.

1) Personal Protective equipment (PPE) –
* Helmets, Safety shoes, gloves, reflective Jackets, safety goggles, ear protection and harnesses.
* Ensure all PPE is certified and regularly inspected.

2) Site Safety Training –
* Induction training for new workers about site hazards and emergency procedures
* Tool box talks and refresher training for ongoing awareness.

3) Safe Scaffolding & Ladders-
* Use scaffolding designed as per standards (IS 3696, OSHA). Ensure firm base, guardrails and proper anchoring
* Inspect before use.

4) Fall Protection -
* Use safety nets, lifelines, and full body harnesses for work at height.
* Maintain barricades around floor openings

5) Material Handling Safety.
* Use mechanical lifting equipment (Cranes, hoists) for heavy loads.
* Train Workers in proper manual lifting Techniques.

6) Electrical Safety
* Use insulated tools, proper earthing and circuit breakers
* Keep electrical panels dry and inaccessible to untrained personnel.

7) fire Safety
* Provide fire extinguishers, alarms and emergency exits.
* Store flammable materials safely and

away from ignition sources.

8) Hazard Communication –
* Display warning signs at hazardous zones
* Maintain Safety Data sheets (SDS) for chemicals

9) Emergency Preparedness –
* Prepare an emergency response plan
* Conduct regular drills for evacuation, first aid, fire response.

10) Health and Hygiene Measures –
* Provide drinking water, sanitation facilities and rest shelters
* Conduct periodic health checkups for workers.

OR

Q8 a) Explain Safety Management and Risk Management. (IDM)

Sol. I Safety Management in Construction Management involves creating and implementing policies / procedures, practices to ensure the safety and well being of workers, prevent accidents and comply with relevant laws and regulations. This is critical due to

hazardous nature of construction sites, where workers face risks such as falls, equipment malfunctions, structural collapses and exposure to harmful materials.

key Elements –

1) Safety Policy and Planning – Develop site safety plans aligned with statutory laws (Eg factories Act, OSHA, IS Code).

2) Hazard Identification – Recognize site hazards like falls, machinery accidents, fire and electrocution

3) Training and Awareness – Safety induction, toolbox talks, emergency drills

4) Personal Protective Equipment (PPE) – Helmets gloves, harnesses, reflective jackets

5) Monitoring and Auditing – Conduct site inspections accidents reporting and safety audits

6) Emergency Preparedness – First aid, firefighting evacuation plans

II Risk Management is the process of identifying, analyzing and controlling potential risks that may negatively impact project objectives

such as cost, time, quality or safety.

Different steps in Risk management Process -

1) Risk identification - List Possible risks (delays, cost overruns, safety hazards, labour strikes equipment failure, weather issues)

2) Risk Analysis - Assess likelihood (probability and impact (severity)
*Tools - Risk Matrix, qualitative & quantitative analysis

3) Risk Response planning -
Choose strategies
* Avoidance - change method to remove risk
* Mitigation - Reduce probability / impact (Eg training workers)
* Transfer - Insurance or sub contracting
* Acceptance - Tolerate minor risks.

4) Risk Monitoring & Control -
Continuously track risks during execution and adjust strategies.

Q85) Explain the terms - (10 M)

a) Facilities Management - Definition - Facilities Management (FM) in construction management refers to the process of coordinating and

Managing built assets (building, infrastructure and services) after the construction is completed to ensure they operate efficiently, safely and sustainably throughout their lifecycle. It includes managing the building after it is built which involves maintenance, services, safety and user comfort.

Key functions —

1) Maintenance Management -
Regular preventive and corrective maintenance of electrical, plumbing, HVAC, elevators and fire safety systems.

2) Space Management —
Efficient Utilization of building spaces for offices equipment or storage

3) Health and safety -
Ensuring compliance with safety codes, fire regulations and occupational health, standards

4) Asset and Equipment Management -
Managing and tracking assets like generators air-conditioning systems, and IT infrastructure

5) Energy & Sustainability Management -
Monitoring energy consumption, water

usage and waste Management. and in corpor -ating green building practices.

6) Support Services -
House Keeping, cleaning, security, Parking management, Catering and waste disposal

7) Emergancy preparedness -
Disaster management planning, evacuation procedures and emergency equipment readiness.

b) Occupancy Certificate (OC)

It is an official document issued by the local municipal authority or development authority, certifying that a constructed building complies with all approved plans, building codes, safety norms and regulations and is safe for occupation

Key features of an occupancy certificate

1) Issued by - local civic authority / municipal corporation / town planning development department
2) When issued - After the completion of construction and successful inspection
3) Purpose - Confirms the building is

Suitable for use (residential, Commercial and industrial)

2) Legal Requirement – Without an occupancy certificate the building is considered unauthorized for occupation.

Documents / Checks Required for occupancy Certificate

1) Approved building plan & Commencement Certificate
2) completion Certificate for the architect or engineer
3) Compliance with fire safety, structural safety, water, sewage and electricity provisions
4) No-objection Certificate (NOC's) from relevant department
5) Tax clearance or payment receipt.

Module - 5

Q9a) Explain the different characteristics of a successful Entrepreneur. (10M)

Sol: A successful entrepreneur embodies a blend of personal traits, skills and

attitudes that help them navigate the challenges of starting and growing a business

Key characteristics of a successful entrepreneur -

1. Visionary Thinking - successful entrepreneurs have a clear forward thinking vision of what that want to achieve. They are able to envision where their business will be in the future and take actionable steps to reach that goal.

2. Risk Taking and Resilience - Entrepreneurs are not afraid of taking Calculated risks. They understand that risk is part of the journey and they carefully evaluate potential rewards against the risks involved

3. Strong Work Ethic and discipline - Successful entrepreneurs are often self driven and have a strong work ethic. They are dedicated to putting in the effort required to achieve their business goals, even during tough times.

4. Adaptability and flexibility - The business world is constantly changing and successful entrepreneurs know how to adapt to market

shifts, customer demands and evolving technologies

5. Strong Decision-Making Ability – Entrepreneurs must be able to make decisions quickly and confidently even in the face of uncertainty. Being able to make the right call at the right time is crucial for business success.

6. Passion and Determination – It is one of the driving forces for entrepreneurs. They are deeply committed to the success for their business and genuinely care about the product or service they provide

7. Leadership and People skills. – successful entrepreneurs are effective leaders who can inspire, motivate and lead their teams towards achieving the company's goals. They know how to delegate tasks, set clear objectives, communicate the vision effectively

8. Financial Judgement – Entrepreneurs need to understand basic financial principles, including budgeting, cash flow management

profitability. They need to make informed decisions about financing, investing and making their business's finances

9. Networking and Relationship building- Networking is key for entrepreneurs. Building relationships with other business owners, potential investors, partners, mentors and customers open door to new opportunities and collaborations.

10. Customer-centric Focus - A successful entrepreneur always keeps the customer at the center of their business strategy They understand their customer's needs pain points, and desires and work tirelessly to provide solutions.

11. Time Management and Prioritization- Entrepreneurs often juggle many responsib-ilities successful ones prioritize their time effectively, focusing on activities that will drive growth and delegate tasks that are not essential to their strengths.

12 Self Confidence and self Belief - Entrepre-neurs need to believe in themselves and their vision. A strong sense of self confidence

helps them to overcome doubts, take risks, and stand firm in the face of critism.

13. Continous Learning & self improvement- Successful Entrepreneurs never stop learning. They seek out new knowledge, stay current with industry trends, and invest in their personal and professional growth.

Q9b) Explain 5M Model and communication skills. (10M)

Ans. 5M model in construction Management is a conceptual framework used to manage the critical elements of a construction Project. The 5M stands for Manpower, Materials, Machines, Money and Methods. Each of these elements is vital to the successful execution of a construction Project, and managing them effectively is key to completing a project on time, within budget and to the required quality standards.

1. Manpower (Human Resources)— This refers to the labour forces involved in the

construction project, including skilled workers, labours, Supervisors, managers and other personnel.

2. Material — This refers to all the physical Materials and resources required for the Construction Project such as concrete, steel wood, bricks, tool and other consumables

3. Machines (Equipment) - This refers to all the machines or machinery and tools required for construction work, such as cranes, excavators, bull dozers, concrete mixers, and safety equipments

4. Money (finance) — This refers to the financial resources allocated to the project including the budget of the labour, Materials, equipment and other expenses

5. Methods (Processes and Techniques) - This refers to the Construction Methods, processes and techniques employed to the complete the project efficiently and to the required standards.

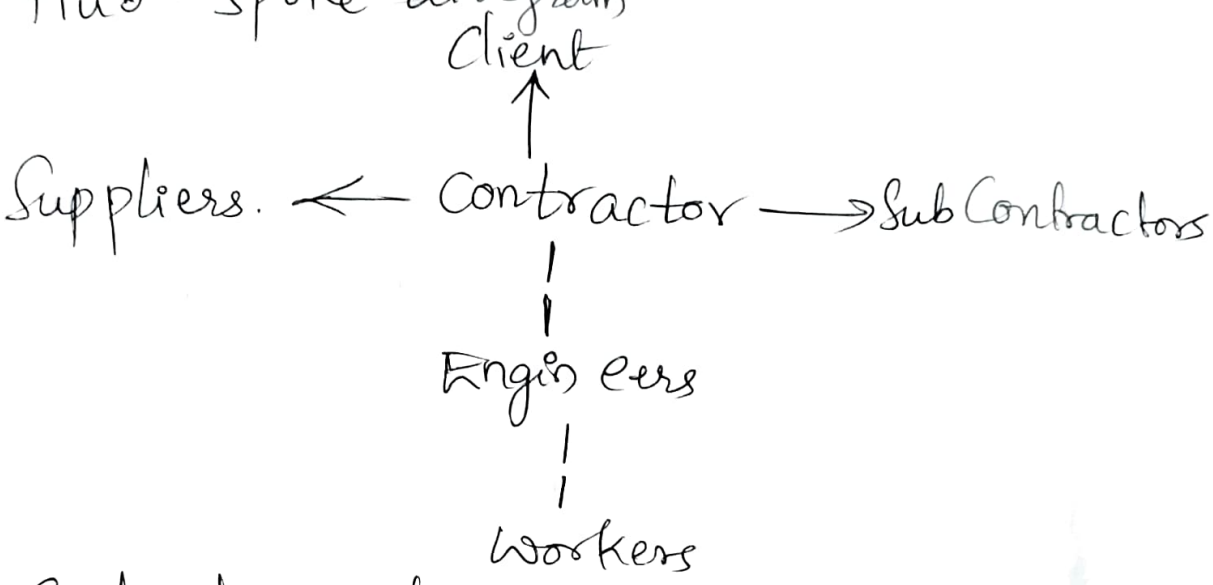
Communication skill - It is the ability to exchange information clearly, accurately

and efficiently among project Stakeholders (Client, Contractor, ~~State~~ Sub contractors, engineers, architects, workers, suppliers and government authorities) to ensure smooth execution of the Project

Importance of Communication Skills -

* Coordination of Teams - Connecting Multiple Parties working on design, procurement and execution
* Avoids Misunderstandings - Clear instructions reduce errors, rework and disputes
* Faster Decision Making - Helps resolve problems on site quickly
* Safety and Compliance - Communicate hazards, safety norms and emergency procedure effectively
* Client Relations - Build trust and ensure client requirements ~~and~~ are well understood
* Documentation & Reporting - Proper written communication (Progress report, contracts, site logs) ensure records and legal compl-iance

Hub - spoke diagram



Contractor acts as the central communic-ator linking client, engineers, subcontractors workers and suppliers. Two way communi-cation (↑↓) ensures flow of instructions, feedback and reposts. This prevents errors, delays and disputes

Effective communication in construction is a two-way process connecting all stake holders (Client, Contractor, Engineers, workers, subcontractors and suppliers) through verbal written, visual and digital means for success-ful project delivery.

OR

(10M)

9 10 a) Explain Business planning Process, marketing planning and Financial Process

Ans.

Ans 1) Business Planning Process. -

Business planning Process is an ongoing process that must be done with great diligence whether ~~that~~ the company is looking for capital or not. The Company's plan shows the steps that must be Completed in order to reach its revenue or profit goals. The end Product of this planning process is the business plan document. Adequate business planning, the Process of raising a critical questions and ~~reaching~~ research -ing answers, helps entrepreneurs avoid those pitfalls and bolster their original ideas into better opportunities.

for good successful business plan -

1) Summarize Our Vision
2) Define Customer Need
3) Research the Market
4) Analyze Market and study the Competition
5) Design Our Company
6) Develop a Business Model
7) Devise Marketing Strategies
8) Describe how the Team fits together

9) Prepare Financial Projections.

2) Marketing plan—

A Marketing plan is a comprehensive document or Blueprint that summaries as business advertising and marketing efforts for the coming year. It describes business activities involved in accomplishing speafic marketing objectives within a set timeframe. To grow the business, we need a marketing plan. The right marketing plan identifies everything from

1) Who is our target Customers
2) How we will reach them
3) How we will identify our competitors
4) How we will retain our customers so they repeatedly buy from us

The marketing plan, will include the following steps.

1) Know our business
2) Products or Services
3) Pricing strategy
4) Sales/Distribution plan
5) Advertising and promotions plan.

3) Financial plan –

The financial plan of a business plan includes various financial statement that show where our company currently stands and where it expects to be in the near future. This information helps us to determine how much financing our business needs and helps outsides determines whether lending us money or investing in our business is a wise use of their funds. Financial plan consists of three financial statements, the income statement, the cash flow projection and the balance sheet and brief explanation / Analysis of these three statements. Our financial plan should include three key financial statement income statement the balance sheet and cash flow statement

* In income statement shows our revenues expenses and profit for a particular period. It's Revenue – Expenses = Profit/Loss

* ~~Cash~~ Cash flow statement / Cash Budget shows the sums expect to be coming into and going out of business in a given time frame
* Balance Sheet shows Company's assets and liabilities. It's called a balance sheet because the assets must perfectly balance the liabilities. This is important because it shows the company's financial position at a specific point in time and it compares what we own to what we owe.

Q10 b) Explain the role and significance of Venture Capital (10M)

Ans Venture Capital is a form of private equity financing provided by investors (Venture capitalists) to start ups or new projects with high growth potential but also high risk. In construction management Venture Capital is often used to finance innovative construction projects new technologies or infrastructure start-ups where traditional banks may hesitate due to risks

I) Role of Venture Capital in Construction Project

1) Funding for New projects —
* Provide necessary capital to start new construction ventures, especially when promoters lack sufficient funds

2) Risk sharing —
* Since construction involves high risks (delays, cost over-runs, market fluctuation) VC investors share part of the financial risk

3) Managerial and Technical Support —
* Venture capitalists not only provide money but also contribute expertise, guidance and industry connections

4) Encourages Innovations —
* Supports projects adopting modern Techniques like greenbuildings, BIM, prefabrication and smart infrastructure

5) Facilitates Growth & Expansion
* Helps Construction firms expand into new markets, take on larger projects or adopt advanced technologies.

(50)

II) Significance of Venture Capital

1) Alternative to Traditional finance – Bank may demand collateral, but VC focuses on Project Potential

2) Boots Entrepreneurship – Encourages young entrepreneurs and start ups in construction

3) ~~Faster Project Execution~~ – Availability of funds ensures smooth cash flow, reducing delays.

4) Improves ~~Credibility~~ Credibility – Association with reputed VC firms enhances market reputation and attracts clients

5) Long Term Value Creation – Venture capital aims at sustainable growth not for short term profit.

Hence : it provide risk Capital, managerial support and innovation funding for new projects

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