

SCHEME OF VALUATION
(Scoring Indicators)

Revision 2015

Course Title: Construction Management and Safety Engineering

Course Code: 5012

<u>Q.No</u>	Scoring Indicator	Split Score	Sub total	Total Score
Part -A				
1	Construction management is the process of planning, co-ordinating and providing monitoring and controlling of a construction project.	2	10	
2	It is a legally valid written document to do a job/ service or supply items at a specified cost based on certain terms and conditions	2		
3	The permissible storage period of materials after the manufacturing date	2		
4	Human resource management is the management of an organizations work force or human resources. It is responsible for attraction, selection, training, assessment and rewarding of employees while overseeing organizational leadership, culture and ensuring integrity with employment and labour laws.	2		
5	MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES	2		
PART-B				
1	Detailed estimate is prepared based on the design, drawings and specification. Actual quantities are worked out from the drawings and multiplied with item rates analysed based on specification. The abstract of the detailed estimate will give the estimated total cost of the project. A detailed estimate is prepared for the sanctions of the project. Revised estimate is prepared whenever there is a change in the rates, quantities of items or specifications. In government departments, once the agreement is signed, the contractor is not eligible for the rate revisions in force after that. However in certain long term projects price escalations may be applicable based on specific terms and conditions.		6	
2	After the opening of all tenders, a comparative statement is made in the office of tender opening authority. It serves to compare the rates of various tenders in respect of each item against estimated rates. The excess or savings for each tender is worked out. The tender opening authority shall verify whether the contractor agreed to all the tender conditions and the consequent variation in the total amount has to be calculated. The arithmetical calculations with respect to rates, quantities, amounts and totaling should also be checked.		6	

3	At a project site, there may be urgencies and petty payments which need to be paid in cash. Imprest money refers to the fixed cash advance given to the project engineer to meet the petty and urgent payments needed at the site. The project engineers make such payments from imprest money and get it reimbursed periodically by submitting the bills. Imprest money is kept in a chest box on site. Imprest money is also available with many officers in government departments, to meet urgent needs like disaster management. Sometimes, imprest money is referred to as petty cash.		6
4	1. Whenever a vacancy arises in the organization, as a result of an employee leaving organization, the management must reexamine the departmental structure to determine whether the position needs to be filled. 2. Review job description, job specifications, selection criteria, qualification required and experience in that particular field. 3. Advertising: It is necessary to prepare draft which includes a brief description of duties, essential and desired criteria regarding qualifications and experience. 4. Vacant positions must be advertised in a manner sufficient to enable suitably qualified persons to apply for the positions. 5. Application forms of the organization should be made available to the candidates.	2X3	6
6	Selection committee- Select committee shall normally consists of a minimum of three representatives. The committee should consider the following a) Short listing of applicants by conducting preliminary test b) Conducting interviews c) Verifying credentials of the candidate d) Ranking the applicants e) Reference checking f) Writing selection report g) Offers of appointment and starting salaries.	1X6	6
5	Demurrage & wharfage: Demurrage is the penalty imposed by the parcel service authority (railways) for the delay in unloading goods from the wagon beyond the time permissible for unloading and vacating the wagon. Wharfage is another type of penalty imposed for the delay beyond the time permissible for removing the goods from the railway platform or goods godown.	2X3	6
6	1. Every large construction project such as big apartment construction or dam construction should have a safety department headed by an officer.	1X6	6

That department should look after safety measures in that project.

2. It is necessary to include the safety measures as a clause in the contract document.

3. Previous safety record of a contractor is an important consideration in the pre-qualification of contractor

4. Safety is a cost item and no worthwhile programme can be developed without providing funds for it.

5. Safety education and training is one of the more important aspects of construction industry

6. Government also needs to improve the safety measures by providing proper inspection. Necessary legislations are to be made.

7. It is also necessary that contractor and trade unions shall extend their concern to safety.

8. Safety measures should start at the planning and designing

7 1. A technocrat is a specialised professional technical skills in a specific area along with administrative capability. 1X6 6

2. Technocrats technical skills

3. Thinks implements innovative ideas to launch products

4. The main responsibility is innovation and improvement of the system

5. Foresees the in scenario, and equips themselves to meet future challenges.

6. More complex technical problems.

7. Enjoys more powers in decision making with regard to technical aspects.

8. A independent charges.

9. Main responsibility is re-engineering and innovation.

10. Works in innovative and emerging areas.

PART- C

III

a Time and Motion Study: Time and motion study is a work measurement technique for recording the times of performing a specific job or its elements carried out under specified conditions. 1X8 8

Time is the duration of activity and motion refers to the effort taken for that activity, which is measured in terms of motion. Work measurement is required to assess the human requirement for a work and to fix the wages or charges for that activity. Work study is also carried out to explore better means of doing a work with lesser effort in order to improve the efficiency through increased productivity.

b CPM 1X8 8

1 Network model

2 activity oriented

3 involves predictable activities

4 single time estimation

5 time is equated ad money

6 Applied to projects with previous experience or repetitive jobs like construction projects

- 7 Crashing concept or time cost trade off concept is applicable
- 8 Differentiates critical and non-critical activities
- 9 The excess time associated with an activity is called Float.

PERT

- 1 Network model
- 2 EVENT oriented
- 3 involves unpredictable events
- 4 THREE TIME estimation
- 5 Happening of events given emphasis
- 6 Applied to R&D, research, or one-time projects where past experience is little.
- 7 crashing concept not applicable money and time are interlinked
- 8 No differentiation between critical and non-critical path
- 9 The term used to indicate spare time with an activity is called slack time.

IV a)

	Resource leveling	Resource smoothing
1.	Resource limited scheduling technique; Importance is given to the limited resources	Time limited scheduling technique; Importance is given to the duration of the project
2.	Removes all resource conflicts	Removes as much resource conflicts as possible; but, may not remove all resource conflicts
3.	May not require additional resources	May require additional resources to address left over resource conflicts
4.	Activities may be shifted beyond the float available while rescheduling the activities	Activities are shifted only to the extent of the float available
5.	Generally, the project duration gets extended	The project duration remains the same
6.	May change the critical path	No change in critical path

4X2 8
7X1 7

- b) The major responsibility of the SE is supervision and inspection of the activities taking place under various divisions within the circle. SE also accords AS and TS as per the financial powers entrusted as per rules.
- Inviting tenders, sanctioning the estimates, revised estimates, and supplementary estimates exceeding the monetary limit of EE is another responsibility.
- The standard data and specifications are reviewed and that for the new items of works arising are prepared by SE.

SE shall also conduct the transfers and postings within the circle.
 All communication to CE on technical matters from lower level offices is routed through SE.
 Circle office provides the data and information required by CE in formulating the budget for the department.

- V a . The measurements should be recorded in the M-book in the AE's own handwriting directly from the site. 4X2 8
 . Measurements should be recorded in the presence of a contractor or his nominee, and their acceptance of the measurements should be recorded on the last page with the certificate 'I accept the measurements'.
 . Measurements should be recorded with permanent ink.
 . No erasing or over righting is permitted. In the event of an error,

- b First and Final (F&F) bill: When the duration of the work is comparatively short and the amount involved is small, the payment is made as a single instalment after the completion of the work by preparing a first and final bill for the whole work. 2X3.5 7

Final bill: In the case of a running account bill system, on completion of the work in all respects, a bill will be prepared for the entire work. This bill is known as final bill. From the final bill, the part payments will be deducted. A complete final bill is prepared to avoid any overlapping of measurements in any part bill and duplication in payments. Sometimes the final bill may contain the last part of the work carried out; in such cases the bill is known as part and final bill.

- VI a Need and objective of quality control in construction projects: 8 8
 Quality control measures are taken to ensure overall quality and to ensure that the specifications in the contract are met with. Quality control also ensures safety, serviceability and durability. Quality control measures checks and malpractices in construction, and creates a quality consciousness among all concerned. The construction industry is highly labour intensive, and the quality of construction depends not only on quality of material but mainly on the workmanship. Hence, the labour and specification have a greater role in maintaining quality in construction projects. Most the construction activities are carried out in the small and unorganised sector, where quality and safety are often sacrificed for profit. For many, locally-made materials like bricks, standardisation is seldom followed. Due to these reasons, following quality control measures at construction projects is inevitable.

- b Conditions for validity of a contract: For a contract to become legally valid, there are some basic conditions: 1X7 7
- . The contract should be on a lawful subject matter.
 - . It should not violate the law of the land.
 - . It should be between consenting parties.
 - . The terms and conditions, including those of payment, should be explicitly specified.
 - . Unrealistic or unachievable conditions should not be made as the part of the contract.
 - . The contract should be signed between legally valid persons with sound mental conditions.
 - . The contract should be unbiased, abiding by the constitution of the country.

- VII a (i) Labour welfare : 2X4 8
- Welfare includes anything that is done for the comfort and improvement of employees and is provided over and above the wages the possibility of providing the following by employer or the contractor or by both on the way on agreed bases could be thought of especially when major construction projects are taken up.
1. dormitories with basic amenities
 2. Locker facilities for storing clothing which are not used while at work
 3. screening films on educational industrial safety measures and social topics
 4. supply of foodstuff and other provisions at concessional rates
 5. subsidized transport arrangement to and from work site.
- To raise living standards of the workforce and achieve higher productivity skill upgradation through suitable training is of utmost importance. Manpower (ii)

development to provide adequate labour force of appropriate skills and quality to different sectors is essential for rapid socio-economic development.

Role of trade unions

Trade unions or labour union is an organization of workers who have branded together to achieve common goals suggest protecting the integrity of its trade achieve higher pay increasing the number of employees and better working conditions. Trade union will have a leader elected by the union.

The main functions of trade unions are

1. improving working conditions at site
2. improving wages of workers
3. Promoting welfare activities such as health plans Life insurance bonus provident fund etc.

	4. providing legal assistance to workers whenever necessary		
	5. Establishing cordial relation between employers and workers.		
b	Hoisting/Lifting equipment.	1x7	7
	. Fork lift: For local shifting of bags, boxes and small items		
	. Construction lifts: For lifting construction materials in multistoried buildings construction.		
	. Gantry crane: For lifting, shifting and placing of materials in godowns, yards and fabrication shops.		
	. Winch & Derik: For piling work and erection of steel structures.		
	. Tower crane: For lifting and placing of materials within its radius, usually used in tall buildings under construction.		
	. Chain block & pulley: For easing lifting operations.		
	. Hydraulic lifts and jacks: For lifting equipment, vehicles etc. and for general purpose lifting operations.		
	. Screw jacks: For lifting equipment, vehicles etc. and for general purpose lifting such as under pinning.		
VIII a	(i)Indents:	2	8
	Withdrawal of materials from stock is on the basis of indents. Particulars regarding head of account, name of division, name of officer, name of work and the contractor from whom the value is recoverable, description and quantity of items required etc. should be furnished in the indent. The storekeeper should scrutinize the indent and endorse in writing about the compliance in full / in part or non-compliance due to need of stock or other reasons.		
	(ii) invoice	2	
	An invoice is prepared by the storekeeper when a material is issued. simultaneously making an entry in the stock register. This invoice should be sent to the indenting officer for acknowledging receipt of the item and then treated as a voucher for entry in the stock register.		
	(iii) Wharfage	2	
	Wharfage is a penalty for the delay in removing goods keeping the railway space occupied beyond certain permissible period. 24 - 48 hours are allowed from the midnight of the day of receipt of articles by the railway an authority for the removal of articles beyond which wharfage is imposed.		
	(iv)Demurrage charges:	2	
	Demurrage charges are lived for detaining wagon beyond the period allowed for it's unloading. Usually its 6 hours.		
b	It is not advisable to pay equal attention to all items of inventory. A-B-C analysis is meant for relative inventory control in which maximum attention is given to items which consume large amount of inventory and a fair attention to medium valued items, while the attention for low valued items is reduced to		

routine procedure level only.

If all the store items of a industrial concern are analyzed in terms of annual consumption of each item in rupees it will be found that nearly 10 percent of the items consume 70 percent of total annual consumption cost.

. The first category of items having small number but high consumption cost are called A items.

. The second category of medium consumption value is known as B items.

. The third category which contain large number of items with small annual consumption cost are C items.

4 7

Control policies for A items

1

> A items are high valued belt which are limited or few in number hence they need very careful and close inventory control.

> The requirement of such items must be planned in advance for expected future so that only required amount arrives a little before they are needed for consumption.

> A items should be stacked as minimum as possible and therefore maximum efforts are required to expedite the delivery in time.

Ordering point, reordering point and minimum stock level should be revised more frequently.

Control policies for B items

1

> B items are medium valued and their number lies in between A and C items. Hence these items need care but not so intensive as required for 1.5 A items.

They can be purchased on the basis of past requirements, a record of receipts and issues are kept and order is placed as the quantity touches re order point.

Control policies for C items

1

> C items are low valued but maximum number items. The stocks of such items may be kept liberally.

> Annual or 6 month orders should be placed to reduce paper work and ordering costs and get advantage of quantity discount for bulk purchase.

IX
a

Managerial style	Entrepreneurial style
<ol style="list-style-type: none"> 1. Follows hierarchy in delegation of authority and power. 2. Follows routine procedures and practices. 3. Does conventional things. 4. All operations are profit motivated 5. High capital investment. 6. Adopts mass production with least HR 	<ol style="list-style-type: none"> 1. There is no specified hierarchy. Everybody is empowered and does all jobs in the organisation. 2. There is no specific routine. Everything is done as per the requirement. 3. Implements innovative and novel ideas. 4. Profit is only secondary to public service

1X8

8

<p>least etc.</p> <ol style="list-style-type: none"> 7. Large organisation with many employees. 8. Production overhead is high, and higher is the cost. 9. Well experienced with the market through market analysis. 10. Sells what they produce. 11. Takes least risk and ultimate goal is profit. 12. Least freedom in flexibility of working. 13. Depends more on professional managerial skill. 14. Works as a stand alone unit. 15. Government support is minimal. 	<ol style="list-style-type: none"> 5. Low capital investment. 6. Follows production by and for masses. 7. Small organisation with limited number of employees 8. Production overhead is low and hence lower is the cost. 9. Less experience in the market. 10. Produces what the society needs. 11. Takes risks and converts challenges into opportunities. 12. Enjoys more freedom and flexibility in working. 13. Depends on entrepreneurial skills and team work. 14. May be a standalone unit or an ancillary unit of large industries. 15. Governments support the MSME in many ways.
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b The Nation or the governments expects MSME (Medium and small-scale enterprises) to perform differently from conventional managerial organisations. This is why governments are offering a lot of facilities and support to such organisations. The major expectations are the following: 1) Generate employment opportunities 2) Produce what the society needs 3) Provide economical products with lesser overhead 4) Support large industries by serving as ancillary unit 5) Contribute to the economic growth of the nation 6) Help the government in lessening un-employment and in the alleviation of poverty 7) Integrity and commitment to the society 8) Willingness to face challenges 9) To be more eco-friendly 10) Produce innovative and import substitution materials (Philosophy behind the 'Atma Nirbar Bharath' or self-reliant nation).

1X7 7

X Comparison between BIS and ISO:

Bureau of Indian standards (BIS)	International Organisation for Standardisation (ISO)
<p>1. The Bureau of Indian Standards is the national Standards Body of India working under the aegis of the Ministry of Consumer Affairs, Food & Public Distribution, and the Government of India. It is established by the Bureau of Indian Standards Act, 1986 which came into effect on 23rd December 1986. BIS is involved in product certification. Their hallmark is ISI.</p> <p>2. BIS standardisation is mainly confined to products meeting the BIS standards. The process followed or its environmental impact is seldom considered.</p>	<p>1. An international consortium of standardisation bodies. The International Organization for Standardization is an international standard-setting body composed of representatives from various national standards organizations. Founded on 23 February 1947, the organization promotes worldwide proprietary, industrial and commercial standards. Now it has 162 members (January 2018) Headquarters: Geneva, Switzerland.</p> <p>2. ISO standards are generic in nature and the same standard is applicable to all kinds of organisations. The basic concept is that following a standard procedure will result in quality.</p>

a
b

4x2 8

The various ISO standards are

- . IS 13999-1990
- . IS 14000-1990
- . IS 14001-1990
- . IS 14002-1990
- . IS 14003-1990
- IS 14004-1990

1 7

IS 13999 - 1990

1

The standard defines basic and fundamental terms relating to the quality concepts to apply for products and services. They also facilitate mutual understanding in international communication. The terms defined in the standard have a direct application to all Indian standards in the series on quality system ISO 14000.

IS 14000 - 1990

1

This standard provides the guidelines for the selection of a series of Indian standards on quality systems which can be used for internal quality management and external quality assurance purposes. IS 14000 introduces the degree of demonstration for the quality systems and the conformity of the product as per the specified requirements. This also specifies the rules for using

the three models given in IS 14001, IS 14002 and IS 14003.

IS 14001-1990

1

This standard applicable when conformance to the specified needs is to be issued by the suppliers throughout the whole cycle from design to servicing. It is used when the contractor specifically requires design effort and product requirement as per the performance terms. This standard represents the requirements involving all the quality system elements detailed in IS 14000.

IS 14002-1990

1

This standard is used when the specified requirements for production are stated in terms of an already established design or specification. Only the supplier capabilities in production and installation are to be demonstrated all the quality system elements listed in IS 14001 except design. After sales, services are present but some are treated less rigidly

IS 14003-1990

1

This standard applied to situations when only the suppliers capabilities for inspection and tests on the product supplied can be satisfactorily demonstrated. But only half of quality system elements of IS 14001 are required in this standard.

IS 14004-1990

1

This standard together with IS 14000 provides guidance to all organizations on quality management. Each of the quality system elements listed in IS 14000 has been explained in IS 14004. This standard helps in developing and implementing a quality system to determine the extent to which each quality element is applicable. It also provides guidance on the technical administrative and human factors affecting the quality of product or services at all stages.