PROFESSIONAL PRACTICE (TH-II)

Lectures Notes & Question Bank

Government Polytechnic, Bhubaneswar

Diploma in Architecture Assistantship | V Semester

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Contents

1 Contract

1.1 Introduction:

When two or more persons have a common intention communicated to each other to create some obligation between them, there is said to be an agreement. An agreement which is enforceable by law is a contract.

Proposal: When one person signifies to another his willingness to do or to abstain from doing anything with a view to obtain the assent of other to such acts or abstinence, he is said to make a proposal.

Promise: A proposal when accepted becomes a promise.

Promisee: The person making the proposal is called promisor and the person accepting the proposal is called promisee.

Consideration: When, at the desire of the promisor, the promisee or any other person has done or abstained from doing, or does or abstains from doing, or promises to do or to abstain from doing, something, such act or abstinence or promise is called a consideration for the promise.

1.2 Types of Contract

1.2.1 Lump sum Contract:

Scope of work, construction drawings and detailed specifications are given to tenderer along with terms and conditions of contract. Schedule of quantities may or may not form a part of tender documents. Even if they are supplied they are not contractually operative and informative only. The tenderer quotes a fixed price for the whole work tendered. If this type of contract is adopted, the owner will be knowing cost of work on the eve of award of contract. However, this is subject to the condition that there is no-variation in scope of work subsequently. It is normal practice to agree on a method to regulate payments for additions and alterations. Provision can be made for escalation in this type of contract also. Detailed measurement of work done may not be necessary when contract specifies stage payment to effect interim payments. This type of contract can be considered when scope of work is frozen, planning, designing and working drawings are completed before inviting tenders.

Contractor quotes one lump sum amount for the work/job assigned. This type of contract is suitable when planning, construction, drawings, and specifications are finalized before inviting tenders. The tenderer quotes a fixed price. In this method owner knows the probable cost of work. However, if the quote is varied, it involves contractual problems and methodology to arrive at the rates for addition, deletion and alterations would be necessary and it is to be built in tender document. This is to facilitate release of interim payments.

1.2.2 Labour Contract:

In this the owner supplies all the materials and the contractor provides only the labour component, i.e. not just labour but also all plant and machinery required for construction work. He is responsible for execution of the work.

As contractor is not responsible for materials; he may misuse and waste materials. This is a popular type of contract as both materials and workmanship will be of high standard. Payments are restricted to labour charges only. In case of extras too only labour charges need to be paid. Problems relating to escalation, cost variation relating to materials will not affect work progress.

This contract at the tender stage can be based on cubic foot construction for the entire construction project (excludes drainage, plumbing and electric, AC works). It is suitable for all types of buildings, extension work alterations and repair of works.

Advantages include cost saving aspect, reduction in disputes, effective supervision in use of materials and workmanship and use of quality materials.

The contractor is responsible for execution of work, Payments are restricted to labour charges only. This contract at the tender stage can be based on square meter/cubic meter of construction for the entire work. It is suitable for all types of buildings, extension work, alterations and repair of works. Advantages include cost saving aspect, reduction in disputes, effective supervision in use of materials and good workmanship and use of quality materials.

1.2.3 Item rate contracts:

For major works, item rate contracts are adopted. Owner indicates quantities and units only for all items of work and the tenderer quotes rates for each individual item. Payment is made for the actual work done based on measurements. This type of contract is useful for works where all items are not finalized at the beginning. Item can be modified within certain limits on the basis of detailed planning and design. The tender form contains all items of work included in bill of quantities excluding lump sum items and those items which are to be executed through another agency. The tenderer quotes rates for each item. Payment is made on the basis of measurements of work done. The quantities included in the tender schedule are approximate and some variation within deviation limits is permissible. This is said to be a balanced method of execution.

1.2.4 Negotiable contract

In this type of contract, negotiation across the table takes place between representatives of the owner and the main contractor for project cost and other conditions of contract. In this type of contract, detailed projects specifications are arrived at by discussions between the owner and the main contractor and consultant. A negotiated contract involves extended discussions for finalization as a competitive contract. Most of the consultancy projects of World Bank are negotiated contracts.

1.2.5 Plinth area rate contract

This type of contract is the easiest method. Hence, it is the most popular method. The total cost of the project in this contract is based on the cost of per unit plinth area, which is set during the bidding process.

For a particular project detailed specification of work is finalized. The proposed rate is worked out on the basis of estimated material cost, labour cost and overhead expenses to complete the unit as a finished product.

The billing is done as [plinth area (in sqm/sft) of building] x [agreed rate in rupees/per sqm/sft].

Mode of payment is fixed at various stages of work, as per the percentage agreed in the contract.

If the contract is only for the procurement of the labour, then the work is split into various items, e.g. R.C.C., masonry, tilling, plumbing etc. These works are entrusted to small but specialized petty contractors on labour rates only. The labour rate is arrived at, considering the labour component of the estimated cost, for that particular item.

1.3 The contract document

Before the work is given out on contract an agreement or bond is prepared. The following documents shall be attached to the contract agreement or bond which should be duly endorsed and sealed. Each page shall bear the signature of the contractor and the accepting authority and all corrections shall be similarly initialed:

1. Title page — having the name of work, contract bond number, etc.
2. Index page — having the contents of the agreement with page references.
3. Tender notice — giving brief descriptions of the work, estimated cost of work, date and time of the tender, amount of earnest money and security money, time of completion, etc. Earnest money, usually 2% of the estimated cost, is deposited along with tender.
4. Tender form — giving the bill of quantities, contractor's rates, and total cost of works, and time for completion, progress of works, security money, penalty clause, etc.
5. Bill of quantities or schedule or quantities — giving quantities and rates of each item of work and cost of each item of work and the total cost of the whole work.
6. Schedule of issue of materials — giving list of materials to be issued to the contractor with rates and place of issue.
7. General — specifying the class and type of works in general.
8. Detailed specifications — of each item of work, and of each material to be used in the work.
9. Drawings — complete set of drawings including plans, elevations, sections, detailed drawing, etc. and site plan, all fully dimensioned.
10. Condition of contract —L containing the terms and conditions of contract in detail. The conditions specify the following
    - Rates inclusive of materials, transport, labour, T. and P. all other agreements necessary for completion of work,

- Amount of the security money,
- Time for completion of the work,
- Progress to be maintained,
- Penalty for unsatisfactory and bad work, for failure in maintaining progress, for delay in completion,
- Mode of payment, running account final payment, security money refund,
- Extension of time limit of contract,
- Rules for employment of debitable agency, termination of contract,
- Minimum wages to labour, compensation to labour,(x) Authority deciding extra items and contractors claims, etc.

11. Special condition — depending on the nature of works, regarding taxes, royalties, which are included in rates, labour camp, labour amenities, compensation to labour in case of accident, etc.

1.3.1 Administrative approval

For any work or project required by a department, an approval or sanction of the competent authority of the department, with respect to the cost and work is necessary at the first instance. The approval authorities the engineering department to take up the work. Administrative approval denotes the formal acceptance by the department concerned of the proposal, and after the administrative approval is given the engineering department (P. W.D.) take up the work and prepares detailed designs, plans and estimates and then executes the work. The engineering department prepares approximate estimate and preliminary plans and submits to, the department concerned for administrative approval.

1.3.2 Technical sanction

Technical sanction means the sanction of the detailed estimate, design calculations, quantities of works, rates and cost of the work by the competent authority of the engineering department. After the technical sanction of the estimate is given, then only the work is taken up for construction. In case of original work the counter signature of the local head of the department should be obtained in the plan and estimate before technical sanction is approved by the engineering department. The power for Technical Sanction differs from state to state.

1.3.3 Contingency budget

The terms 'Contingencies indicates incidental expenses of miscellaneous character which cannot be classified under any distinct item sub-head, yet pertain to the work as a whole.

In an estimate a certain amount in the form of contingencies of 3 per cent to 5 per cent of estimated cost, is provided to allow for the expenses for miscellaneous petty items which do not fall under any sub-head of items of work. Miscellaneous incidental expenses which cannot be classified under any sub-head or item, are met from the amount provided under contingencies.

If there is any saving against the amount provided under contingencies, this amount may be utilized with the sanction of the competent authority, to meet the expenses of extra items of work, if any unforeseen, expenditure, expenses to minor changes in design, etc.

1.3.4 Tender earning money

While submitting a tender the contractor is to deposit a certain amount, about of the estimated cost, with the department, as earnest money as guarantee of the tender. This amount is for a check so that the contractor may not refuse to accept the work or run away when his tender is accepted. In case the contractor refuses to take up the work his earnest money is forfeited. Earnest money of the tenderer whose tender has not been accepted is refundable. The amount of earnest money depends on the estimated cost of works and is as follows:

Rs 50 for works up to Rs. 2,000.00, Rs. 100.00 for works above Rs. 2,000.00 yo Rs. 5.000 Rs. 20000 for works above Rs. 5,000.00 to Rs. 10,000.00 and Rs. 100.00 for every Rs. 5.00000 or part thereof above Rs. 10,000.00.

Earnest money should be in cash or encashable at any time. Earnest money may be in the form of deposit in Treasury or State Bank or other approved Bank or Government security, or Savings Certificate or Post Office, Savings Pass-Book or cash Certificate, pledged to the Executive Engineer.

1.3.5 Security deposit

On acceptance of the tender, the contractor has to deposit 10% of the tendered amount as security money with the department which is inclusive of the earnest money already deposited. This amount is kept as a check so that the contractor fulfils all the terms and conditions of the contract and carries out the work satisfactorily according to the specifications and maintain progress and completes the work in time. If the contractor fails to fulfil the terms of contract his whole or part of the security money is forfeited by the department. The security money is refunded to the contractor after the satisfactory completion of the whole work after a specified time, usually after one rainy season or six months of the completion of the work.

Instead of collecting the whole of security money in one instalment before starting the work, this can be collected gradually by deducting from the running account bill of the contractor.

Usually the earnest money is taken as part of the security money and the balance amount of the security money is collected by deduction from the running account bill of the contractor at every running bill, up to the extent of 10 per cent of the total cost of whole work.

1.4 Mode of payment

1.4.1 Bill

Bill is the account of work done or of supply of materials made, and includes the particulars and quantities of work done or materials supplied, their rates and amount due. It contains full and clear particulars of the claim or amount due. Reference to the agreement number is also given in the bill.

1.4.2 Voucher

Voucher is a written document with details which is kept in record as a proof of payment. For any payment first, a bill is prepared and payment is made on the bill duly checked and acknowledged by the payee, by signature on revenue stamp as required, and after the payment is made bill becomes voucher document which is kept in record.

1.4.3 Advance payment

This means payment made on a running account to a contractor for work done by him but not measured. Advance payment is not generally made to the contractor, but may be made under special cases when the work is sufficiently progressed but measurement cannot be taken for certain valid reasons, on the certificate of the Assistant Engineer in charge of work that the value of work done is in no ease less than the advance payment made or proposed to be made and detail measurement will be taken as soon as possible.

1.4.4 On account or running or Intermediate payment

This means payment made on a running account to a contractor for works done or supplies made by him duly measured and entered in M.B. when only a part of the whole work or supply has been done and the work or supply is in progress. During the progress of work the contractor is paid time to time and when the contractor has done some progress he is paid up to the extent of work done by him.

1.4.5 Final payment and final bill

This means the payment made on running account, made to a contractor on the completion or determination of his contract and in full settlement of the account. The bill on which final payment is made is known as 'Final Bill'.

1.5 Tender

Tender is a written offer submitted by the contractors in respect of the notification given, to execute certain work or supply of some specified articles or transport of materials at certain rates with the terms and conditions laid down in the tender documents. The form in which it is to be submitted is supplied by the department to eligible contractors on usual payment of cost. The tender duly filled in placed in the Tender Box with locking arrangements kept in the room of the Officer inviting tender on or before the specified hours and date notified through the tender notice.

1.5.1 The drafting notice inviting tender

The notice inviting tender papers is a very important document on which tenders and subsequent agreements with the contractors are based. Tender notice should stipulate reasonable time for completion of work. In an urgent case the authority which is competent to approve NIT in that particular tender might reduce the period but the period should be realistic period. All tender notices should be in the standard form of the department. It is displayed in

the notice board of the division and also circulated to the related sub-divisions and other divisions of the department. For wide publicity of major work the tender notice is required to be published in two daily local News Papers.

E-TENDER NOTICE (ONLINE)

HITES
HLL INFRA TECH SERVICES LTD

(Subsidiary of HLL Lifecare Ltd, a Government of India Enterprise)

For & on behalf of

U. N. Mehta Institute of Cardiology & Research Centre

(Affiliated to B. J. Medical College, Ahmedabad)
Civil Hospital Campus, Asarwa, Ahmedabad - 380 016, Gujarat (India)

Tender No. HITES/IDN/UNM - AHD /2016-17

For & on behalf of U.N. Mehta Institute of Cardiology & Research Centre (UNMICRC), Ahmedabad, Gujarat; the Vice President (ID), M/s HLL Infra Tech Services Ltd. (HITES), (Subsidiary of HLL Lifecare Ltd., A Government of India Enterprise), B-14A, Sector - 62, NOIDA (UP) -201307, invites online Item Rate Bids through e-tendering from eligible Bidders/firms for the following works :

Name and Description of Works	Estimated Cost	Completion Period	EMD Amount
New Construction of Phase - II Paediatric Cardiac Hospital Building (GRIHA 3-Star), Hostel Block & Underground Parking on Ring Road of Civil Hospital at U. N. Mehta Institute of Cardiology & Research Centre, Ahmedabad, Gujarat	**Rs. 305 Crore**	**12 Months**	**Rs. 3 Crore**

• **Date of Uploading of E-Tender (Online)**	**31/08/16 at 13:00 hrs.**
• **Date of Pre-Bid Meeting** **Venue :** 4th Floor, Central Lecture Theatre, New Building, UNMICRC, Civil Hospital Campus, Asarwa, Ahmedabad - 380016, Gujarat (India)	**13/09/16 at 11:00 hrs.**
• **Last Date of Downloading of E-Tender**	**03/10/16 at 18:00 hrs.**
• **Last Date of Online Submission for all E-Tender Documents, Technical Bid and Financial Bid**	**03/10/16 at 18:00 hrs.**
• **Last Date of Physical Submission of EMD, Tender Fee and Technical Bid Documents** **Address :** Vice President (ID), M/s HLL Infra Tech Services Ltd. (HITES), B-14A, Sector-62, Noida-201307, Uttar Pradesh (India)	**04/10/16 at 16:00 hrs.**
• **Date of Opening of Technical Bid** **Address :** M/s HLL Infra Tech Services Ltd. (HITES), B-14A, Sector-62, Noida-201307, Uttar Pradesh (India)	**04/10/16 at 17:00 hrs.**
• **Date of Opening of Financial Bid**	Technically qualified bidders will be informed later.

- Bidders need to register themselves with (n)procure tender management system of Govt. of Gujarat **www.unmicrc.nprocure.com** to participate in e-tender.
- For submission & other e-tender details, please refer detailed NIT on website of HLL at **www.lifecarehll.com/tender** & of UNMICRC at **www.unmicrc.org** and e-tender portal @ **https://unmicrc.nprocure.com**
- **UNMICRC/HITES reserves the right to accept or reject any application without assigning any reason or incurring any liability whatsoever.**

Vice President (ID), HITES
For & on behalf of UNMICRC, Ahmedabad

In order to minimize the heavy advertisement charges short tender notice should be given in tabular form which contains essential information as below:

i. Name of the authority inviting tender
ii. Particulars of contractors eligible to submit tenders
iii. Name of work and its location
iv. Estimated cost of work
v. Price of tender form and other tender documents
vi. Earnest money to be deposited
vii. Time of completion
viii. Last date of sell of tender paper, last date of permission
ix. Last date, time limit and place of receipt of tender and also time of opening tender
x. Accepting authority

1.5.2 Tender documents comparative statement

Comparative statements of Percentage rates and Lump Sum tenders are made out by the Officer opening the tender. It contains information regarding the name of the contractor, date of receipt of tenders, percentage above or below the rates entered in the tender documents, amount in the case of Lump Sum tenders. The recommendation or orders regarding acceptance or rejection of the tender is recorded on it.

Comparative statement of Item rate tenders is more elaborated and comprehensive and is drawn up by the office in P.W.D Form-14 after thorough computation and check under supervision of the Divisional Accountant. On the basis of the comparative statement, the Divisional Officer has to make an intelligent scrutiny himself. The comparative statement must correctly incorporate the rates and amount and the totals drawn up and checked on the individual tenders. A mistake in it may lead to the work being awarded to a contractor who is not lowest.

If the acceptance of a particular tender does not rest with the Divisional Offer, he has to forward the tenders along with comparative statement and tender documents with his recommendation or observations to the next higher authority for consideration and orders in a sealed confidential cover.

1.5.3 Termination of contract

The contract can be terminated by the Executive Engineer or by competent authority in default or bankruptcy of the contractor and penalty may be imposed as per terms of the contract agreement. If the contractor does not fulfil the terms and conditions of contract as - if he leaves the work, if he does not maintain progress, if he does not observe the rules, instruction, etc., the contract agreement may be rescinded and all of his security money be forfeited or penalty up to the extent of 10% of the estimated cost may be imposed on the contractor. For termination of contract due notice shall have to be served on the contractor.

1.5.4 Penalty for damage.

Penalty is a sort of fine for non-fulfilment of terms of contract. Every contract usually contains certain provisions for penalty for breach of terms and conditions of contract as for not

maintaining the progress, for delay in completion, for bad work, etc. The penalty may be a fixed sum per day, or a certain percentage of the estimated cost up to 10%, etc.

1.6 Contract work

1.6.1 Classification of work

Works are primarily divided into two classes - Original works and Repairs or maintenance.

1.6.1.1 Original Work:

Original works include all new constructions whether of entirely new works or of additions and alterations to existing works which increase the capital cost of a building or work. Repairs to newly purchase or previously abandoned buildings required to render them useable are also original works.

1.6.1.2 Repairs Work:

Repairs or maintenance includes all operations required to maintain in proper condition buildings and works in ordinary use.

The repair works are classified in under mentioned categories:

1) Day to day repairs/service facilities
2) Annual repairs
3) Special repairs
4) Quadrennial repair work

1.6.1.2.1 Day to day repairs

Day to day repairs are carried out by CPWD in all the buildings under its maintenance. The works which are to be attended on day to day basis such a removing chokage of drainage pipes, man holes, restoration of water supply, replacement of blown fuses, repairs to faulty switches, watering of plants, lawn mowing, hedge cutting, sweeping of leaf falls etc. are attended under day to day service facilities. The purpose of this facility is to ensure satisfactory continuous functioning of various services in the buildings. These services are provided after receipt of complaint from the users at the respective Service Centers. Complaints of periodical nature like white washing, painting etc., which are usually got attended through contractors and cannot be attended on daily basis is transferred to register of periodical repairs.

1.6.1.2.2 Annual Repairs

The works of periodical nature like White washing, colour washing, distempering, painting etc. are called Annual Repair works and these are generally undertaken; through system of contracts. The periodicity of applying white washing and colour washing for a building has been laid down by the Government. The periodicity is two years for white washing and colour washing and three years for painting. In addition, works such as patch repair to plaster, minor repairs to various items of work, replacement of glass panes, replacement of wiring damaged

due to accident, replacement of switches, sockets tiles, Gap filling of hedges/perennial beds, Replacement/Replanting of trees, shrubs, painting of tree guards, planting of annual beds and trimming /pruning of plants etc., which are not emergency works and are considered to be of routine type, can be collected and attended for a group of houses at a time and particular period of financial year, depending upon the exigency. Such works can be done under day to day repair also. The yard stick for annual repairs cover both the above facilities.

1.6.1.2.3 Special repairs

As the building ages, there is deterioration to the various parts of the building and services. Major repairs and replacement of elements become inevitable. It becomes necessary to prevent the structure from deterioration and undue wear and tear as well as to restore it back to its original conditions to the extent possible. The following types of works in general are undertaken under special repairs: -

i. White Washing, Colour washing, distempering etc., after completely scrapping the existing finish and preparing the surface afresh.
ii. Painting after removing the existing old paint from various members.
iii. Provision of water proofing treatment to the roof. All the existing treatments known are supposed to last satisfactorily only for a period of about ten years.
iv. Repairs of internal roads and pavements.
v. Repairs/replacement of flooring, skirting, dado and plaster.
vi. Replacement of doors, window frames and shutters. Replacement of door and window fittings.
vii. Replacement of water supply and sanitary installation like water tanks, WC cistern, Wash basins, kitchen sinks, pipes etc.
viii. Re-grassing of lawns/grass plots within 5-10 years.
ix. Renovation of lawn in 5-6 years.
x. Replanting of hedges in 8- 10 years.
xi. Completely uprooting and removing hedges1 shrubbery.
xii. Replanting of Rose beds in 5-6 years, Perennial beds in 5-6 years, Canal beds in 1-2 years etc.
xiii. Shifting of any garden feature from one site to another within building.

1.6.1.2.4 Quadrennial repair work

Besides annual repair work of white washing and color washing, every fourth year special repair works are done for through repair as repainting of doors and windows, patch repair of plastering etc. Special repair work every fourth year is known as Quadrennial Repair

1.6.2 Petty Work, Minor Work and Major Work:

A petty work is one the cost of which does not exceed Rs. 20,000, a minor work is one the cost of which exceeds Rs. 20,000, but does not exceed Rs. 1,00,000 and a major works is one the cost of which exceeds Rs. 1,00,000.

NOTES—(1) In the case of mixed estimates, if the amount debitable to the “Original Works" portion of the estimate is Rs. 20,000 or less than it should be treated as a petty work and not minor work although the total cost of such mixed work (including repairs) might exceed Rs. 20,000 and the departmental head should be responsible for the execution of such mixed work and for finding funds for the purpose from their own budgets. When the original works portion of a mixed estimate exceeds Rs. 20,000 then it should be treated as a minor work and the whole work including repairs should be entrusted to the Public Works Department for execution. Provision for such works should be made in the Public Works Department budget both under "Original Works" and "Repairs."

(2) When an existing building is to be re-modelled or a portion thereof is to be replaced, then, if a type of construction or material of a more costly nature than that which previously existed is to be adopted or if the proposed reconstruction will result in an increase of accommodation, only one estimate will be prepared but the estimate will be a mixed estimate part of which is chargeable to "Original Works" and part to "repairs." The amount to be charged to "Original Works" will be the total estimated cost of the work minus the original cost (estimated, if necessary) of that portion of the building which has been replaced.

Exception—When in any one estimate, the amount chargeable to "Original Works" is less than Rs. 2,000 the whole of the expenditure may be charged to repairs ; provided that if the work relates to a residential building the amount which is correctly chargeable to "Original Works" is added to capital value and taken into account in calculating the rent.

2 Supervision

2.1 Duties and responsibility of Jr. Engineers

As Junior Engineer is the primary element in the executive unit. He is responsible both for the execution of works and maintenance of accounts with which he is concerned.

The duties of the Junior Engineers engaged on original and maintenance works are as below:-

1. To collect engineering data for estimates and prepare rough drawing and site plans connected therewith.
2. To supervise and see that all works under his charge are done according to the specifications drawings, standards laid down and approved samples. He is expected to remain at site throughout in order to see that the works are executed properly in accordance with the requirements. If any work is done by a Contractor below specification it is the duty of the Junior Engineer to bring it at once to the notice of the Assistant Engineer in-charge and also make a note in the site order book.
3. To arrange and issue materials, T&P to contractors /works at the proper time so that there is no obstruction in the execution of work.
4. To keep Government materials, T&P in his custody and care; maintain proper accounts of receipts, issues and balances; arrange adequate watch and ward.
5. (i) To record measurements of work done by the contractor.
   (ii) To take the level of areas where earth work is done and prepare earth work calculation sheets, lead charts, etc.
6. To prepare abstract of measurements at the time of preparation of bills.
7. To prepare the recovery statements for the material/ T&P supplied to contractors, or other services rendered by the department and send them to the S.D.O for effecting recovery.
8. To prepare theoretical consumption statements.
9. To submit progress report of works as may be required by his superiors and to bring to the notice of his immediate superiors hindrances to the execution of work.
10. To maintain the prescribed registers/accounts like cement register; cube register curing register; register of testing of fine aggregate. M.A.S. account site order book, Account of Temporary advances; Imprest Accounts, Stock account; T&P account; standard MBs, etc.
11. To maintain Register of Inspection of Buildings in his section in the prescribed form and to bring to the notice of the superior officers any defects noticed at the time of his inspection. If any building/structure is particularly unsafe, this should be specifically brought to the notice of higher authorities.
12. To prepare completion drawings; extra and substituted items statements; deviation statements; reduction rate statements.
13. To mark the attendance of W.C. and regular staff in the register. To arrange for casual labour required for departmental work. To see that the Work-charged staff is properly and fully employed; to watch the outturn and performance of the staff and labour engaged under him and to send daily reports as required under the rules.
14. To prepare estimates for additions and alterations in buildings.

15. To prepare estimates for annual repair and special repair works and petty works after collecting data from site.
16. To furnish full details for preparing supplementary estimates, revised estimates.
17. To submit reports of all accidents.
18. To arrange for immediate first aid and further medical aid in case of accidents.
19. To submit occupation and vacation reports of buildings in his charge.
20. To detect/ report and remove unauthorized construction/ encroachments in Government colonies/ Govt land.
21. To verify bills, A.T.D.S. etc.
22. To submit required returns to his superior officers.
23. To maintain drawings of buildings, services etc. under his charge.
24. To initiate action for disposal of surplus/unserviceable materials/T&P/empties etc.
25. To ensure prompt action on complaints received in enquiry officers.

2.2 The architect's role in a construction project

2.2.1 Sketch Stage

a) Take Client's instructions regarding the requirements of the project as a whole.
b) Acquaint the Client with the Conditions of Engagement and Scale of Professional Charges of the Indian Institute of Architects.
c) Visit the site.
d) Prepare in agreement with the Client a programme of accommodation and requirements.
e) Examine Legislation, Code, and Standards as they affect the project.
f) Prepare preliminary Draft Sketches and notes sufficient to explain the Architect's general understanding of the Client's requirements and the outline of his plan for the best way of fulfilling them including an estimate of the order of cost involved. Estimates of cost prepared from the preliminary Draft Sketches simply indicate from the Architect's experience the probable order of cost of the whole project; (Under no circumstance shall the architect guarantee such Estimates of Cost).
g) Discuss the draft sketch with the Client and make such modifications as may be necessary to satisfy the Client that his requirements will be fulfilled.

2.2.2 Preliminary Stage

a) Advise the Client on the appointment of Surveyors, Consulting Engineers and other Consultants, where necessary.
b) Obtain from the Client, or prepare at the Client's expense, a detailed topographical survey of the site to a scale and contour interval determined by the Architect. The survey shall include all the necessary data related to the existing Public Utility Services, lines of streets and pavements, building lines, adjoining properties, Rights of Lights, restriction, easements, party walls and boundaries.
c) Assist in obtaining provisional approvals from Statutory Bodies. Local and other interested parties.

d) Obtain from the Client or prepare at Client's expense test site borings, soil test, and such other tests required to provide essential design data from subsoil conditions; tests shall be carried out as directed by the Architect or consulting engineers.
e) Prepare (with the assistance of Consultants as necessary) a Sketch Scheme. Report and Estimate of cost, in sufficient detail to enable the Architect to proceed with the Working Drawing Stage of the project: (Estimates of Cost prepared with Sketch Schemes are intended for the Client's budget forecasting).
f) Obtain Client's approval of the Sketch Scheme. Report and Estimate of cost. Upon approval the Architect's services in connection with the Preliminary Stage have been completed.

2.2.3 Working Drawings Stage

a) Advise Client and obtain approval on the form of Contract and method of placing the Main Contract.
b) Discuss with the Client and obtain approval for the procedure to be adopted with nominated Sub-contractors and nominated suppliers.
c) Discuss with the client and obtain approval for the procedure to be adopted in relation to imported materials and goods if required.
d) Provide the Surveyors, Engineering Consultants and other Consultants with all the necessary information to allow them to perform their specialist work.
e) Prepare the necessary drawings and documents and undertake the agreed procedure in relation to nominated Sub-contractors and nominated suppliers.
f) Prepare the necessary Schedules and documents and undertake the agreed procedure in relation to all materials and goods.
g) Direct and coordinate the Architectural, Engineering and Surveying work, and prepare (with the help of Surveyors, Consulting Engineers and other Consultants, as necessary), complete working drawings, Schedules, Specifications and Bill of quantities (if required) to describe the whole project adequately for the purpose of placing the main Contract by the approved method.
h) Prepare (with the services of a quantity Surveyor if necessary) the approved Form of Contract, assist to obtain approval of the Form of Contract from Government and Government Agencies when required.
i) Obtain Client's approval for any material deviation in design or cost or the Working Drawings, Schedule and Specifications from the approved scheme.
j) Assist to obtain final approvals from Statutory Bodies and other interested parties: Upon finishing the Working Drawings, sufficient for starting the construction work in hand. Schedules, Specifications, Schedule of Quantities (if required) and Form of Contract, the Architect's Services in connection with the Working Drawings Stage have been completed.

2.2.4 Construction Stage

a) Conduct the approved method of placing the main contract on behalf of the Client (with the assistance of a quantity Surveyor if necessary).

b) Analyze and report on the results of the approved method of placing the main Contract, and make recommendations to the Client to assist in the final selection of the main Contractor (with the assistance of a quantity surveyor if necessary).
c) Supply to the main Contractor, sufficient copies of the working drawings, schedules, specifications, Bill of Quantities (if required) and other Contract Documents to enable him properly to fulfil his obligations under its conditions of the contract.
d) Assist the main Contractor to prepare a Works Progress Schedule.
e) Prepare and supply to the main Contractor such further drawings, specifications or details which may be required for the proper execution of the works.

Upon placing all contracts and supplying all drawings to the various contractors, the Architect's services in connection with construction stage have been completed.

2.2.5 Supervision Stage

a) Check and approve shop drawings submitted by Contractors.
b) Give periodical supervision and inspection as may be necessary to ensure that the works are being executed in general accordance with the contract. *Constant supervision does not from part of the duties undertaken by the Architect and his supervision alone cannot guarantee that the work is carried out strictly in accordance with the drawings and Specifications.*
c) Direct the Clerk of works and other Site Supervisory Staff appointed, to provide constant superintendence to ensure that work is carried out strictly in accordance with the working drawing and specifications.
d) Advise Client on the progress and quality of the work.
e) Advise Client if the total of authorized expenditure is likely to be exceeded.
f) Advise Client if the Contract time is likely to be varied.
g) Issue Variation Order on behalf of the Client on Client's instructions or if changes are necessary for technical reasons.
h) Check main Contractor's applications for payment (with the assistance of a Quantity Surveyor if necessary).
i) Prepare Interim Valuations (with the assistance of a Quantity Surveyor if necessary).
j) Issue certificates authorizing payment.
k) Certify accounts.
l) Certify the final completion of the works after demobilization by contractor.

Upon issuing the Final Certificate, the Architect's services in connection with the Supervision Stage have been completed.

2.3 The duties and responsibility of Architect and Architects' instructions

Architect's profession combines

i. Business - Deals with clients money
ii. Technology - Planning, designing controlling and coordination of all activities
iii. Quasi-Judicial - Administration of contract between owner and contractor and resolving any differences between them as and when they arise.

Architect's duties and liabilities are as under:

1. With the client:

Contract for professional service is entered with the client. The contents of the contract are:

i. Responsibilities
ii. Remuneration
iii. Copyright
iv. Mode of payment of fees
v. Dispute resolution
vi. Termination of contract.

In large works, employment of professionally capable consultants are preferred. There could be various sets of consultants under the main consultant for planning and design of main work, services and construction management. Proper coordination among these professionals is also required.

2. Contract document:

Contract document is between client and the contractor. It incorporates duties and liabilities of an architect. These duties relate to:

i. Extension of time
ii. Variations
iii. Removal of defective work
iv. Interpretation of conditions of contract
v. Modification of design
vi. Certification of payments.

3. Statutory bodies:

The statutory bodies are as follows:

i. Approval of plans by the local municipal/corporation authorities
ii. Design and execution of works as per building bye laws and regulations
iii. Environmental clearance where necessary

iv. Clearance of airport authorities if required

4. Indian Institute of Architects:

i. Compliance to code of conduct
ii. Compliance to scale of professional charges as prescribed by IIA.
iii. Adherence to rules for architectural competition

The IIA is abided by regulation framed by council of architecture. Registration of architects vide Sec 23 of "The Architects Act 1972"

2.4 Certificate of virtual completion of work.

Virtual completion" means physical construction of all aspects of the contracted work and certified by the Architect as being ready for acceptance by the Owner.

2.5 Measurement book and methods of making entries and checking.

2.5.1 Measurement Book

- Measurement Book is an important document in which measurements are recorded for the work done by the contractor, or for the materials received at the site or services rendered.
- MB belongs to the Division – and is serially numbered recording to whom issued, date of issue, etc (DEE/ SDO).
- Contractor payments are made based on the measurements recorded in the MB.
- It is considered very important accounts record and maintained very carefully and accurately and form substantial evidence in the court of law - should need arises.
- Measurements are written legibly so that transactions are readily traceable.

2.5.2 Recording of measurements

Each set of measurements should commence with entries

- Work Name as given in the estimate / agreement
- Work location
- Contractors Name
- Agreement Number and date
- Work commencement date
- Work completion date
- Measurement recording date

2.5.3 Format for the MB

BOQ No.	Item Description	Nos	Length	Width/ Breadth	Depth/ Height/ Thickness	Qty	Remarks

2.5.4 Writing the MB

- Item specification is clearly written completely
- Actual Measurements executed - length, width, depth etc entered in the respective columns
- Quantity is then computed (executed)
- Possibility of errors are more since manual
- After the measurements are taken, abstract is prepared duly carrying forward the quantities to the abstract MB
- Format for the abstract MB is

BOQ No.	Item Description	Rate	Upto date bill		Upto previous bill		This month bill		MB Page No.
			Quantity	Amount	Quantity	Amount	Quantity	Amount	

Writing abstract:

- Agreement No and item description is written in full
- Quantity of each distinct item of work done is carried out from the detailed MB
- Details of quantities, rate for that item as per agreement and arrive at amount of each item
- Full nomenclature and description should be written for extra or substituted or any additional item that is not covered in the agreement,
- Neat recording of measurements
- Signature of the contractor- or his authorized agent should sign in the MB
- Measurements are recorded in ink
- Bill is then prepared

3 Valuation

3.1 Meaning of valuation

Valuation is the art of assessing the present fair value of a property ab a stated time. Valuation of anything is an estimate of the value of that thing in terms of money. It only attempts at suggesting the fair prices. Yet, valuation is not an arbitrary process. It is based on certain facts and indications and only after a judicious processing of such facts and indications we can suggest the value or fair price of the property.

Rises and falls of the fair price can occur in a very short space of time. It follows therefore that all valuations must clearly state the date to which the valuation relates, since time is the essence of all valuations.

3.2 Difference between Value and Cost

Cost means the actual cost of construction whereas value means the present market value or fair sale value which may not be the same to the cost of construction. Value depends on supply and demand whereas cost is a constant amount requires for the construction. For an example, suppose a person has constructed a nice out-house at a desert place according to his liking at a cost of Rs. 80,000/-. But just after that he wants to sale the property which has a little value to the others choice and he gets a maximum offer of Rs. 40,000/-, The owner was about to sale his property, but just at that time a plan becomes sanctioned to develop a big industry adjoining to the area and subsequent growth of population starts. So due to demand the out-house becomes valuable and he sales at a price Rs. 1,25,000/-. So, the value of the property varies from Rs. 40,000/- to Rs. but the cost remains the same Rs. 80,000/-, Therefore, value depends on demand and supply where cost is a constant amount.

3.3 Purpose of valuation.

i. Purchase for investment or for occupation.
ii. Tax fixation.
iii. Sale.
iv. Rent fixation.
v. Insurance Premium.
vi. Mortgage value.
vii. Compulsory Acquisition.
viii. Speculation
ix. Betterment charges
x. Auction bids
xi. Wealth tax
xii. Gift tax
xiii. Probate
xiv. Estate duty
xv. To determine the amount of court fee stamp.

3.4 Different terms related to valuation:

3.4.1 Gross Income

Gross income is the total income or receipts from all sources without deducting the outgoings necessary for taxes, maintenance, collection, replacement or loss of income, ground rent etc, whatever may be.

3.4.2 Outgoings

Outgoings are the expenses to be made by virtue of being in possession of the property and also the expenses of maintaining the property. Outgoings may be classified under the different heads of taxes, repairs, management and collection charges, insurance premiums loss of rent. It should also include sinking fund. A short description of each head of outgoings are given below.

3.4.2.1 Taxes

This include Municipal taxes. The rates that are payable for Occupiers' share and for Owners' share of taxes are calculated on the basis of 'Annual Rental Value' of a property after deducting an amount for repairs etc. (usually 10% of the rent for repairs). The amount of taxes to be deducted will vary from place to place in accordance with the laws in force at that particular Municipality. For big properties Wealth tax and Property tax are also required as imposed by the Government.

3.4.2.2 Repairs

An amount is provided for annual repairs of buildings to keep the same in a sound condition although actual repairs are taken in hand periodically say 3 to 5 years intervals, In average cases 10 percent of the gross rent is provided for valuation purpose. Although cost of a building should not have a direct bearing on the amount for repairs, yet there is also a method to provide 1% to 1.5% of the cost of construction for annual repairs.

3.4.2.3 Management and Collection Charges

An agent collects rents for big buildings and if the state is large he will also manage the state. Usually the charges vary from 4 to 5 percent. This includes investigation of petty complains and supervising petty repairs. This figure of 4 to 5 percent does not include salaries of Liftman, Sweeper to clean staircase, common passage etc. pump attendant and Electric Charges for common lights, pump and Lift etc. with due allowance for the service charges. In order to include all such expenses at least 9 to 10 percent of the gross rent should be allowed as the management and collection charges.

For small buildings having no lift, no common pump or light etc. and the owner collects the rent himself the outgoing on account of this head is not practically considered.

3.4.2.4 Insurance

The amount of actual insurance premium is considered as an outgoing expense. A property may not be insured at all, but this does not mean no deduction should be made for insurance premium. Because market value is required to be ascertained from the view point of a prudent purchaser who will always insure his building against fire and if the owner has failed to take this precaution, a valuer should do s0, otherwise an incorrect figure will be found. Insurance premium depends on the construction of the building, the nature of occupancy of the building, the adequacy of the water supply, the pressure of the water main and facilities for firefighting etc.

3.4.2.5 Loss of Rent

Part of a property may remain vacant for some period and will not fetch any rent for that period. Therefore the loss of rent is considered as outgoing expenses and deducted from the calculated gross rent. The average loss of the past 3 years may be considered as a guide to calculate the yearly loss of rent.

3.4.2.6 Sinking Fund

It will be discussed later in this chapter.

3.4.2.7 Ground Rent

When a structure is constructed on a lease hold property (lease may be 99 years or 999 years) then a specified amount in a specified period as may be agreed upon is considered as outgoing from the gross income of that property.

3.4.3 Net Income

Net income is the gross income less all outgoings which includes taxes, premiums, repairs, insurance, management and collection charges, loss of rent, ground rent, sinking fund etc. necessary to maintain the property in a state to command that income.

3.4.4 Scrap Value

Scrap value is the value of dismantled materials of a built up property at the end of its utility period and absolutely useless except for sale as scrap, When it applies to an old building which has outlived its useful span of life a certain amount can get by selling the old useful materials like, bricks, steel, wooden articles, etc. less cost of demolition of the building. The scrap value of a building is usually considered as 10 percent to the cost of construction. Thus in the case a machine which do not give useful service or becomes obsolete and cannot be used again by repairing or replacement of parts, the value obtained at that time by selling the machine in one unit or cut in parts is known as scrap value, The scrap value is also known as junk value or Demolition value, On rare occasions scrap value may be zero or even negative if the cost of dismantling or removal becomes equal or more than the scrap value.

3.4.5 Salvage Value

It is the estimated value of a built up property at the end of its useful life without being dismantled. Salvage value will be high when a building, a machine becomes useful after replacement and remodeling,

3.4.6 Market Value

Market value of a property is the value at which it can be sold in the open market at a particular time, In the open market means the property is offered for sale by advertise in daily News Papers and all necessary steps are adopted 80 that every person who desires to purchase the same can make an offer, The owner willing and not obliged to sell might reasonably expect the price from a willing purchase with whom he was bargaining for the sale, So market value must be free from forced value or sentimental value.

Values vary time to time. Factors affect the market value of a properly are

i. Forces on demand and supply - Few buyers as compared to a number of properties available for sale in a locality will result in low prices for the property and vice-versa,
ii. Rise in population - Rise in population may be due to growth of new industries or influx or by multiplication will result heavy demand for land-building properties.
iii. Cost of production - The present cost of production affects the value due to rapid change of price index in comparison with the rate of depreciation.
iv. Purpose of purchase - Value of a property will be more when the purchaser can reside himself even in partly vacant house or speculate to run a business by purchasing the property.
v. The imposition of control of prices of building materials—Thig will cause violent fluctuation in the prices of building materials and the values of buildings will vary an appreciable amount from time to time
vi. Rent Restriction Act - Value of a property is calculated from its probable annual income through rent and so due to certain passing of a rent restriction act, by a Government may be the means of causing a slump in property values.
vii. Improvement by Public Schemes - The taking of any public service scheme, like sewer line, waterline, means of transport etc. to an area lacking modern amenities will tend to make that area more attractive and will be closely followed by an increased in land values. Even a proposal to bring a sewer line to an unsewered area or before roads are made and services installed will cause to rise the value of property at that area.
viii. Interest on Schedule Banks or Government securities - The lowering of the Schedule bank interest or Government security higher may be the interest of making more money available for investment in property and vice-versa.
ix. Abnormal condition - Due to insecure conditions like riots, war trend etc. cause of values may drop and remain for a considerable period.

3.4.7 Book Value

Book value is defined as the value of the property shown in the account book in that particular year, i.e. the original cost less the total depreciation till that year, Thus the book value of a property gradually reduces at a constant amount year after year up to the limit of scrap value i.e. up to its utility period, Book value is applicable on building and movable properties but not on land, This is usually required in the accounts book of a company to show the assets and also required to determine the reserved price for court sale.

Difference between Market and Book Value as follows.

Market value	Book value
a) The value is fixed by purchaser.	a) The value is fixed by the rate of depreciation.
b) The value may be higher during the subsequent years due to increase of price index.	b) The value cannot be higher during the subsequent year even due to increase of price index.
c) The value may be constant for a period.	c) The value cannot be constant but there is a gradual fall.
d) This is applicable for any type of properly.	d) This is not applicable in case of land or metal articles like Steel, Copper and Gold etc.
e) Market value is considered for valuation,	e) Book value is considered for Accounts book of a company.
f) This depends on forces of demand and supply, development of the area etc.	f) Book value is not variable due to its demand and supply or development of the area

A market value higher than the book value indicates profit for the seller. For an example the book value of a Motor Car after its useful life may show only the cost of scrap value or 10 percent of its original cost, But due to increase of price Index and sound maintenance the market value of the car may be more than the book value or even more than the cost at which this was originally purchased. This is a case of profit for the seller.

3.4.8 Sinking fund

Sinking fund is an amount which has to be set aside at fixed intervals of time (say annually) out of the gross income so that at the end of the useful life of the building or property the fund should accumulate to the initial cost of the property. A building a machine, a vehicle etc., becomes useless after certain years i.e. at the end of its life. Hence it is necessary to make some provision whereby the owner can accumulate to a sum required for rebuilding the premises or can replace the article. For the above purpose sinking fund is periodically collected and deposited to a bank to get highest compound interest or sinking fund insurance policy is made to the insurance company throughout the life of a building or article. In case when a building

is built up or a vehicle is purchased by taking loan, a small portion of rent or income is set aside every year or at regular intervals and may be paid directly to the lender by way of instalments.

3.4.8.1 Determination of sinking fund

The calculation of sinking fund depends upon the life of a building and also upon the rate of interest. When the life of a building is over the owner can get back a certain amount on the sale of old building materials which is known as scrap value. This amount is considered as 10% of the building cost. Therefore, the calculation of sinking fund is made on 90% cost of the building.

Let

S = Total amount of the sinking fund;

I = Annual instalment required;

i= Rate of interest expressed in decimal;

n = number of years and

I_0 = Co-efficient of annual sinking fund

So that $I = SI_0 = \frac{Si}{(1+i)^n-1}$

Example-1: An owner has installed an air cooler in a building at a cost of Rs. 8,000/-. If the life of the air cooler is 18 years calculate the amount which he should get aside annually as sinking fund to accumulate the above cost at 5% compound interest.

Annual sinking fund require = $I = \frac{Si}{(1+i)^n-1} = \frac{8000 \times 0.05}{(1+0.05)^{18}-1} = 8000 \times 0.0355 = \text{Rs. } 284/-$

Therefore, the owner should set aside an amount of Rs. 284/- annually and invest the same @5% compound interest for a period of 18 years in order to accumulate the total cost of Rs. 8,000/-

Example-2: A person has purchased an old building at a cost Rs. 90,000/- on the basis that the cost of land be Rs. 50,000/- and the cost of building structure be Rs. 40,000/-. Considering the future life of the building structure be 20 years workout the amount of annual sinking fund at 4% interest when scrap value be 10% to the cost of building structure.

Scrap value = 10% cost of building structure = 0.10 x 40,000 = Rs. 4,000/-

∴ The total amount of sinking fund to be accumulated =40,000-4,000 = Rs. 36,000/-

Annual sinking fund for re-equipment of Rs. 36,000 in 20 years.

$$I = \frac{Si}{(1+i)^n - 1} = \frac{36000 \times 0.04}{(1+0.04)^{20} - 1} = 36000 \times 0.0336 = \text{Rs. } 1290.60$$

∴ Annual instalment for sinking fund for a period of 20 years = Rs. 1,209.60.