FOR SPECIAL ATTENTION OF THE TENDERERS

1. Proof of Registration in P.W.D. & Technical Education as a contraction shall be attached with the tender.
2. Current income tax clearance certificate shall be enclosed along with the tender.
3. Bank Guarantee will not be accepted towards Earnest Money Deposit, Additional Security, withheld amount etc.

4 The following particulars shall also be furnished by the contractor along with the tender.

   (a) List of details of works executed by the contractor with their values.

   (a) A List of details of works under execution by the contractor, with their values.

   (b) Annual turn-over of the contractor for the last one year. Necessary certificate to the effect issued by the respective Bank shall be attached.

5. The lowest tenderer when informed that his tender is under consideration shall have to furnish Pert Chart in the proper form within a week from the date of receipt of letter calling for Pert Chart. The Pert Chart shall confirm to the departmental time schedule for the completion of the work furnished in the Tender Notice. If the Pert Chart is not received within a week from the date of receipt of communication, his tender will not be considered.
5. The tender documents will be issued to the contractors whoever registered their names as contractors in P.W.D. or Technical Education in the appropriate class only.

Tender Schedule containing ..... Pages .....plans Issued to
.....

SPECIAL INSTRUCTIONSTO THE TENDERERS

1. The tenderers' should carefully go through the tender schedule quote their rates for all items and alternative items also.
2. The rates should be filled in neatly in figures and words and taking into account the metric units specified in the tender. Scribbling, over-writings and erasing should be avoided as for as possible.
3. The amount of each item of work should be worked out. Proper care must be taken in working out the amount of each item of work taking into account the unit for which the rate is quoted and the quantify of work to be done under the item.
4. The total from each page should be arrived at end carried out to every page and the grand total value of work should be worked out and shown at the end.
5. The tenders should be submitted along with a covering letter giving full details as called for in the tender notice and with particular care to the following items if they are registered contractors, if registered together with the copy of letter registering them in the appropriate class (classes).

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i Details of the earnest money deposit remitted the D.D. and date and Bank in which the Earnest Money Deposit was paid.

ii. In case the tenderers are eligible for concessional Earnest Money Deposit and accordingly they have remitted, the reference number and date in which the concession was granted to them is to be specified and if possible, a copy of this aforesaid reference maybe enclosed along with the tender for ready reference.

ii. Income tax clearance certificate should be submitted along with the tender.

iii. Details of previous work done by the tenderers covering the cost of the work, the agreement number and date, the department in which the work was carried out etc., so as to assess the previous experience of the tanderers at once as also make an easy reference to their record of work. Year-wise details should be furnished as to see that these tenderers have minimum experience of major buildings.

V. List of various machineries and other equipments at the tenderers disposal for using the execution of the work.

vi. The tender forms should be filled in while submitting the tender. The tenders submitted without filling-up the tender form are liable to be rejected.

vii. The tenders must be submitted in a foolscap cover duly signing all the conditions, plans and Schedule issued as Tender documents.

APPENDIX – I

TENDER NOTICE (For L.S. Contractor)
(as amended in G.O.MS.No.01 8.PW D1.30.04.86, 1660 PWD dt.1 2.10.88 and 913 PWD Dt.28.04.89)

1. The Tenders will be received by The Principal, The M.D.T. Hindu College, Tirunelveli at his office up to 3.00 p.m. on 27.04.2015 for the work of Multipurpose Gymnasium Building.

The tenders should be in the prescribed form obtainable from the office of the Principal, M.D.T. HinduCollege,Pettai,Tirunelveli-10 or website – www.mdthinducollege.org. The Tenders will be opened by The Principal, M.D.T. Hindu College, Pettai, Tirunelveli at 4.00 p.m. on the date aforementioned.

The tenderers or their agents are expected to be present at the time of opening of tenders. The tender receiving officer will on opening each tender, prepare a statement of the attested and un-attested corrections therein and hand it over to the tenderer concerned and initial all such corrections in the presence of the tenderer If any of the tenderers or their agents finds it inconvenient to be present at the time then in such a case, the tender receiving officer will be opening the tender of the absentee tenderer, make out a statement of the unattested corrections and communicate to him. The absentee tenderers shall then accept the statement of the correction without any question what so ever.

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Tenders must be submitted in sealed covers and should be addressed to the Principal, M.D.T. Hindu College, Pettai, Tirunelveli-10, the name and address of the tenderer and the name of the work being noted on the cover.

2.1 If the tender is made by an individual, it shall be signed with his full name and his address shall be given. If it is made by a firm, it shall be signed with the co-partnership name by a member of the firm who shall also sign his own name and address of each member of the firm shall be given. If the tender is made by a corporation, it shall be signed by a duly authorized officer who shall produce with his tender satisfactory evidence of his authorization. Such tendering corporation may be required before the contract is executed to furnish evidence of its corporate existence. Each tenderer must also send a Certificate of Income Tax Verification from the appropriate income tax authority in the form, prescribed therefore. The certificate will be valid for one year from the date of issue, for all tenders submitted during the period.

3.1 In the case of proprietors of partnership firm, it will be necessary to produce the certificate aforementioned for the proprietor or proprietors and for each of the partners as the case may be.

3.2 All tenders received without a certificate as aforementioned will be summarily rejected.

Each tenderer must pay an earnest money a sum of Rs.62,500/-(Rupees Sixty Two thousand and five hundred only) in the form of Demand Draft, drawn in favour of The Principal, The M.D.T. Hindu College, Tirunelveli-10 payable at Tirunelveli. If the tender application forms is download from the college Web site, at the time of submission the cost of application form of Rs.15.750/-(Rupees Fifteen thousand seven hundred and fifty only) should be paid in the form of Demand Draft, drawn in favour of The Principal, The M.D.T. Hindu College, Tirunelveli-10 payable at Tirunelveli . This earnest money will be refunded to the unsuccessful tenderer on application, after intimation is sent of rejection of the tender or at the expiration of two months from the date of tender, whichever is earlier

4.1 The earnest money will be retained in the case of the successful tenderer and will not carry any interest.

5.1 The tender will remain valid for a period of three calendar months from the last date for receipt of tender. If the tenderer fails to attend the office before the end of the specified period, his tender will not be considered. He shall of his tender by the officer duly authorized in his behalf under article 299(1) of the constitution, therein after called "the accepting authority" make security Deposit, of 2% of the value contract in one of the forms prescribed in Tamil Nadu public works Account code (i.e) by taking into account of the amount of earnest money deposit already deposit with the tender, it would be sufficient to pay the balance amount to make up the 2% of the value contract for the purpose of security deposit.

5.2 The security Deposit together with earnest money deposit and the amount withheld according to clause-64-1 of Genera! conditions to the contract, shall be retained as security for due fulfillment of contract or receipt of written communication of acceptance of tender, if the- tenderer fails to pay requisite security deposits within the period specified in the written communication or backs out from the tender, the earnest money deposit shall be forfeited .

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5.3 If the contractor fails to carry out the contract, after paying the requisite deposits then the contractor will be liable for the excess expenditure if any incurred to complete the work as contemplated in the General conditions to the contract.

6. The tenderer's particular attention is drawn to the Sections and clauses in the General conditions to the contract dealing with:-

1 . Test, inspection and rejection of defective materials and work
2. Carriage
3. Construction plant
2. Water and lighting
4. Cleaning up during progress and for deliver
5. Accidents
6. Delays
8, Particulars of payment

6.1The contractor should closely peruse all the specification clauses, which govern the rates which he is tendering.

7. A schedule of qualities accompanies this tender notice. It shall be definitely understood that the college does not accept any responsibility for the correctness or completeness of tins schedule is liable to alterations by omissions, deductions or additions at the discretion of the Principal, M.D.T. Hindu College, Pettai. Tirunelveli-10 or as set forth, in the conditions of contract. The tenderer will, however base his lump sum tender on this schedule of quantities.

7.1 The tenderer should quote the tender Premium alone (i.e.) percentage above/below the departmental value put to under. The percentage quoted by the tenderer shall be for two places or decimal only.

8. No alteration which is made by the tenderer in the contract form, the conditions of contract, the drawings, specifications or quantities accompanying same will be recognized if any such alterations are made the tender will *be* void

9. The attention of the tenderer is directed to the contract requirements as to the time beginning work, the rate of progress and the dates for the completion of the whole work and its several parts. The following rate of progress and proportional value of work done from time to time as will be intimated to the Principal, M.D.T. Hindu College, Pettai, Tirunelveli-10. Certificate of the value of work done will be required. Date of commencement of this programme will be the date on which the site (or premises is handed over to the contractor.

ANNEXURE

Period after date of commencement	Percentage of work completed based on contract lump amount

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It will not be incumbent on the part of the. contractor to employ technical Assistant, / Assistants when the work is kept in abeyance due to valid reasons and if during such period,- in the opinion of the Principal, the employment of technical Assistant/Assistants is not required for the due fulfilment of the contract.

10. Tenderer, who has not already registered himself as P.W.D. Contractor shall furnish evidence of good record and capacity to do work.

10. A tenderer submitting a quotation in which the tender accepting authority consider excessive and / or indicative of the insufficient knowledge of current prices or definite attempt to profiteering will tender himself liable to be debarred permanently from tendering or for such period as the tender accepting authority may decide. The tender rates should be based on the controller price for materials, if any fixed by Government or the purchase, under the provision of clause S of boarding and profiteering prevention ordinance 1943 as amended from time to time and on similar principles in regard to tabour and supervision in the construction,

12. The Contractor shall comply with the provisions of the Apprentices Act 1961 and the. rules and others issued the rounder from time to time. If he fails to do so, his failure will be a breach of the contract and the competent authority may, at his discretion, cancels the contract or invoke any of the penalties for the breach of contract provided in the conditions and contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act.

13. In case of contracts for construction of buildings either permanent or semi permanent buildings a 'sum equivalent to 2 % of the value of work done will be retained with the M.D.T. Hindu College, Tiruneleli for one year reckoned from the date of completion of the work in order to enable the departmental officers to watch the effect of all seasons on the work done by the contractor. The amount so retained with the College will be refunded only on the expiry of one year period referred to above and on execution of Indemnity Bond by the contractor for a further period of four years. The contractor shall be liable to set right all defects arising out his faulty execution or substandard work notice during the above five year period of his cost.

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SCHEDULE C

1. "And whereas the Contractor. who is not professionally qualified, as to employ technical non indicated below to the Engineer for the work,

2. And whereas the Contractor who is professionally qualified or who has undertaken to employ technical men under him, has to agree that the technically qualified men will always be at the site of work during working hours personally checking all items of work and paying extra attention to such work as may demand special attention (e.g) R.C.. Works etc.

Sl.No.	Value of *Contract*	*Qualification and number of Technical Assistants tobe employed*
1	UptoRs. 1.00 Lakh	No technical Assistant need be employed. If. situation andnature ofwork -warrants, a d iploma holder in Civil Engineering or a retired Junior Engineer may be employed.
2	**Rs.** 1.00 lakh to Rs. 5.00 lakhs	One diploma holder in Civil Engineering or not less than oneretired Junior Engineer.
3	Rs. 5.00 lakhs to Rs. 10.00 lakhs	One B.E. (Civil) *or* equivalent Degree holder or not *less* thanone retired Sub-Divisional Officer (A.E.E. or A.D.E.) or one diploma holder with three years experience!
4	Rs. 10.00 lakhs to Rs. 25.00lakhs	One S.E. (Civil) or equivalent degree holder with threeyears experience in Civil Engineering works or not lessthan one retired Sub-Divisional Officer Plus one diplomaholder in Civil Engineering or two diploma holders in Civil
5	Rs.25.00 lakhs to Rs. 50.00 lakhs	One B E. (Civil) or equivalentdegree holder with threeyears experience or not less than one retired Sub-DivisionalOfficer (Retired A.E.E. or. A.D.E.) plus two diploma holders in Civil Engineering or retired Junior Engineers.
6	Rs.25.00 lakhs to Rs. 50.00 lakhs	Alternative one S.E. (Civil) or equivalent degree holderwith three years experience or not less than one retiredSub-Divisional Officer and one more B.E.(Civil) orequivalent degree holder. To be examined In individual cases depending on the natureor work and the technical skill involved as defined in the Tender noticeregarding the- -number of qualified technicalpersonnel to be employed by the contractor.

3. A penalty of Rs.500 p.m. for Diploma holder and Rs.1.000/- p.m..for Degree holder will be levied in case of default on the part of contractors in following the norms laid down above

It will not be incumbent on the part of the contractor to employ Technical Assistant/Assistants when the work is kept in abeyance due to valid reasons and if during such period in the opinion of the Engineer the employment of Technical Assistant/Assistants is not required for the fulfillment-of the contract.

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Note: (1) In case the Contractor, who is professionally qualified is not in a position to remain always at the site of the work during working hours personally checking all items of work and paying extra attention to such work.', as a demand special attention (e.g.) R.C. Works etc. he should employ technical qualified men (as prescribed for the works)

One Technical Assistant may be employed by the Contractor for more than one work situated within one kilometer, provided the monetary limit prescribed for the nature of technical staff to be employed is adhered to by one and the same contractor..

I am/we are professionally qualified and my/our qualifications are given below:

Name	Qualification

I/we will employ the following technical staff for supervising the work and will see that one of them is always at site during working hours personally checking all Items of works and paying extra attention to such works as require special attention (e.g.) Reinforced concrete work-etc

Name *of members of Technical staff proposed to be employed*	Qualification

The contractor shall employ with the provision of the Apprentices Act. 96 and the Rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the competent authority may, in his discretion, cancel the contract or invoke any of the penalties for breach of contract provided in the agreement. The contractor shall also be liable for any pecuniary liability, arising on Account of any violation by him of the provisions of the Act.

Without prejudice to the generally of the above clause, the contractor shall, during the currency of his contract, when called upon by the Engineer-In-charge, engage and also ensure engagement by sub-contractors and other employed by the contractor In connection with the works, such number of apprentices in the categories mentioned below and for such periods, as may be required by the Engineer-in-charge.

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FOR CONTRACTORS SPECIAL ATTENTION

1. Clean river sand shall be used in all cases.

2. Only clean fresh water should' be used on the work. The special attention of the-contractor is drawn to clause 39 of Preliminary Specification of the TNDSS regarding water and lighting.

2 The- broken stone for *concrete* and RCC work should be of granite and passed by the Engineer.

3. All iron work or steel, work of every kind except such as to be embedded in concrete shall immediately on arrival at the site be properly scrapped and wire brushed and given a priming coat approved lead painting without claim for extra.

4. The iron hold fasts shall be- built up in walls in cement mortal 1:3 at the time of construction of walls. No extra claim shall be due for the same wherever hold fasts are to be provided to 9" thick walls, those should be fixed with cement concrete 1:3:6 using 20 mm gauge broken granite stone jelly for proper anchorage and proper binding. No separate rate for such pockets of concrete filling at holdfast points will be allowed and this will be measured as masonry along with adjacent masonry.

5. The teakwood shall be of best India teakwood only and shall subject to inspection and' approval by the Principal, M.D.T. Hindu College,-Tiruneiveli-10 before use on the work. Country wood where specified shall be of Karimarudu or Kongu for scantling and Aiyini for planks.

6. Holes for electric wiring, water supply and drainage etc., shall be provided as directed during progress of work without any claim for extra.

7. The work will be carried out with the least hindrance to the adjoining building and the contractor will be responsible for any damages, caused to the existing fixtures electric fittings etc., in the course of execution and the contractor shall make good any damage without any claim for extra.

8. In the case of T beams and Ell beams, the quantity give in the schedule is the quantity of rib portion only: the top flange portion will be always measured with the general slab portion and paid for at the slab rate only. For all RCC works the rate shall include the treatment of bearing as per plate No.2 of 1945 as per TNDSS (Page 3 of 1964 Edition).

10. Concrete works: All exposed concrete surface will be required to be finished by cement plaster as detailed in Schedule 'A'

11. Plastering: Ali external comers, edges of beams, edges of doors and window openings etc., shall be finished sharp using richer mortar and also finished truly vertical or horizontal as the case may be. The rate for plastering shall include the cost finishing as above and no separate extra for the corners, edges, beams, etc., shall be paid.

12. If rates are not separately called for, for similar items of works in different floors, the contractor should note that one rate is applicable for all floors indicated in the detailed plans. Any claim for extra for such items floor war will not be entertained under any circumstances.

10. The Principal, M.D.T. Hindu College, Tirunelveli-10 reserves the right, to split up the work and entrust the main work, internal water supply and sanitary arrangement to different contractors without assigning any reason therefore.

11. The projection if any to the masonry will be measured under the relevant items and no extra will be paid for finished the same.

, CONTRACTOR

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ADDITIONAL SPECIFICATION

1. The arrangement of M.S. rods for all RCC works shall be in accordance with the working drawing. supplied.,

2. (i) The planks for forms and centering for RCC works shall be of well-seasoned timber approved by The Principal, M.D.T. Hindu College, Tirunelveli-10 according to clause 10 or TNDSS No.30. They must be made smooth and perfectly level at top so as to give smooth and even finish to the RC ceilings. Alternatively, the contractor may use steel sheets over wooden form's provided the required finish to 'the underside of the slab is obtained. Mango planks shall not be used under any circumstances. Centering and form work shall be provided to the extent and area ordered by the extent and area ordered by the engineer during execution.

(ii) Payments for centering works for all RCC items shall be made only after the concrete is laid, even though separate items for centering works are included in the schedule.

(iii) All cement concrete for RC works shall be machine mixed and vibrated.

(iv) All lime mortal shall be ground in mortar well as per TNDSS.

3. MS and RT steel rods should be cut and placed as reinforcement with proper cars according to the available rods at site so as to ensure the minimum possible wastage.

(a) The cut bits will not be taken over by the College.

(b) The maximum percentage of wastage permissible in any size of reinforcement rods shall be 5%

(c) In respect of wastages that may occur during the execution of work, the contractors shall be allowed a quantity up to 5% over the theoretical requirements and. shall be charged only at the issue rate.

(d) For any issue in excess of 5% wastage it should be charged at double fee issue rate.

4. For the quantity of cement used in excess of the theoretical requirements with an allowance of up to 5% for wastage and for the quantity not returned to the department in good conditions, a recovery will be made at two times the issue rate.

ADDITIONAL CONDITION - I

1. The contractor shall be responsible for the safe custody and storage of the materials at the places of the work-spot approved by the Principal, M.D.T Hindu College, Tirunelveli-10.

1. The contractor's special attention is invited to clause 37'and 38 of the preliminary specification of TNDSS and he is requested to provide at his own expense, shed latrine and urinal for his workman.

1. If night work is required to fulfill the agreed rate of progress, all arrangement shall be made by the contractors inclusive of lighting without any claim or extra.

1. Any of the items in the schedule may be omitted or radically altered. No variation in rate shall become payable to contractors on account of such omissions or variation in quantities.

5 Reference to TNDSS in the schedule of quantities referred to reprint 1952 and addenda corrigenda issued thereafter.

6. The construction of the building will be deemed to be complete only if all the items or works including finishing items contemplated herein are executed.

7. The contractor shall abide the. Contractors labour regulation of the PW Framed by the TamilNadu Government.

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ADDITIONAL CONDITIONS OF CONTRACT II

1.The contractor shall at his own expense provide arrangement or the provision of footwear for any labour doing cement mixing work and all other similar type of work involving the use of tar, mortar etc., to the satisfaction of the Engineer-incharge.

2. When there is complaint of non-payment of wages to the labour, bills or the contractor may be withheld pending a clearance certificate from the Labour Department.

ADDITIONAL CONDITIONS III

Rules for the, provision of Health and Sanitary arrangement for workers employed by the PWD and its contractors,

The contractor's special attention is invited to clause 37,38,39 and 51 of the primary specification in the Tamil Nadu Detailed Standard specification and he is requested to provide at his own expense, the following amenities, to the satisfaction of the Principal, M.D.T. Hindu College, Tirunelveli-10

First Aid..

1. At the work site, there shall be maintained in a readily accessible place, first aid appliances and medicines including adequate supply of sterilized dressings and sterilised cotton wool. The appliances shall be kept in a good order. They shall be placed under the charge of a responsible person who shall, be readily available during, working hours.

Drinking Water

2. (a) Water of good quality fit for purpose shall be provided for the work people, on a scale of not less than three-gallons par head per day,

(b)Where drinking-water is obtained from an intermittent public water- supply, each work place shall be provided with storage tank where such drinking water shall be stored.

(c) Every water supply and storage shall be in a distance not less than 15 meters from any latrine, drain or other existing well which is within such proximity of-latrine, drain- or any other source of pollution, the well-shall be properly closed if water is drawn from it for drinking. All such wells shall be entirely closed and be provided with a trap door which shall be dust and water proof.

(d) A reliable pump shall be fitted to each covered well/The trap door, shall be kept locked and opened only for cleaning or inspection which shall be done atleast once a month.

Washing and Bathing Places

3. Adequate washing and bathing places shall be provided separately for men and women: Such places shall be kept in clear and drained conditions. Bathing or washing should not be allowed in or near the drinking water well.

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Latrines and Urinal,

4. There *shall* be provided within the premises of very work place Latrines and urinals in an accessible place and the accommodations separately for each of them shall be on the following scale or on the scale so directed by the Principal, M.D.T Hindu College, Tirunelveli-10 in any particular case. (i) Where the number of persons employed does not

exceed 50	... 2 seats
Where the number of persons employed exceed	
50 but does not exceed 100	... 3 seats
For every additional 100 persons	.... 3 seats

If women are employed separate latrines and urinals screened from those for men shall be provided on the same scale. Except in work places provided with water flushed latrines connected with a water borne sewage system, all latrines shall be provided with acceptable dry earth system which will be cleared at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. The Latrine and Urinals shall be tarred inside and outside at least once a year.

The excreta from the latrines shall be disposed off at the contractor's expenses, in outside pits approved by the Local Public Hearth Authority. The contractor shall also employ adequate number of scavengers, conservancy staff to keep the latrines and urinals in a clean condition.

Shelters During Rest

5 At the work site, there shall be provided at free of cost, two suitable sheds one for meals and another for rest for the use of labour.

Creches

6. At every work place at which 25 or more women are working there shall be provided two huts of suitable size for the use of children under the age of 6 year belonging to such women. One hut shall be used for infants, Games and Play and the other as their bedroom. The huts shall not be constructed on lower standard than the foilc'. vir.g.

(i) Thatched roofs. (ii) Mud floors and walls. (Hi) Planks spread ever the mud floor and covered with matting.

The size of the crèche or crèches should vary according to the number of women-workers. The crèches should be properly maintained and necessary equipment like toys etc. should be provided and huts shall be provided with suitable and sufficient sweepers to keep the place clean. There shall be two ayahs in attendance. Sanitary utensils shall be provided to the satisfaction of the Health Officer of the area concerned. The number of the huts shall be restricted to children, their attendants and attendants of the children.

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Sheds for Workmen

7. The contractor should provide at his own expense shed for housing the workmen. The sheds shall be on a standard not LESS than the cheap shelter type to live in which the work pertaining to locality are accustomed to. A floor area of about 1.8m - 1.5 m for 2 persons shall be provided. The sheds are to be in row with 1.5m Gear space between sheds and 24 m clear space between row if conditions permit. The work people's camp shall be laid out in units of 400 persons each. Each unit to have clear space of 14.4 m around.

ADDITIONAL CONDITION IV

Safety provision in the building industry-conditions in addition to clause 36 of Preliminary Specification of TNDSS.

PART-1 Article 1

1. Suitable scaffolds shall be provided for workmen for all work that cannot be safely donefrom a ladder or by other moans.

2. A scaffold shall not be constructed, broken down or subsequently altered except.

(a) under the supervision of a competent and responsible person and

(b) by competent workers possessing adequate experience in this kind of work.

3. Scaffolds shall be constructed that is no part thereof can be displaced inconsequence of normal use.

4. Scaffolds shall not be over loaded so far so practicable and shall be evenly distributed.

5. Before installing lifting gear on scaffolds special precautions shall be taken to ensure the strength and stability of the scaffolds.

6 Scaffolds shall be periodically inspected by a competent person.

7- Before allowing a scaffold to be used by his workmen every employee shall, satisfy as to whether the scaffold has been, executed by his workmen or not he should take steps to ensure that it functions fully with the requirements of this article.

ARTICLE - 2

1. Working platforms, gangways and staircase shall be so constructed that no part thereof sags unduly or unequally.

(a) Be so constructed and maintained to obviate from risks of person tripping or slipping and (b) Be kept free from any unnecessary obstruction.

(c) Every working platform gangway working place and stair case shall be suitable forced.

ARTICLE 3

1. Every opening in the building or in a working platform shall except for the time and to the extent required to allow the excess of persons or the transport or shifting of materials be provided with suitable means to prevent the fall of persons or materials.

1. When persons are employed on a roof where there is danger of failing from height exceeding that to be prescribed by national laws or regulations, suitable precautions shall be taken to prevent the fall of persons or materials.

2. Suitable precaution shall be taken to prevent persons being struck by articles which might full from scaffolds or other working places.

CONTRACTOR

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PATTAI, TIRUNELVELI 627 010

ARTICLE 4

1. Safe means of access shall be provided to all working platforms and other working places.

2. Every ladder *shall be* securely fixed and of such length as to provide secure handhold and foothold at every position at which is used.

3. Every place where work is carried on and the means of approach there to shall be adequately lighted.

4. Adequate precautions shall be taken to prevent danger from electrical equipment.

1. No material in the site shall be so attached or placed as to cause danger to any person.

PART II

GENERAL RULES AS TO HOISTING APPLIANCES

ARTICLE 5

1. Hoisting machines and tackle including their attachments and supports shall

(a) be of good mechanical constructions sound material and adequate strength and free from patent defect and

'(b) be kept in good hoisting or lowering materials or as a means of suspension shall be of Suitable quality and adequate strength and free patent strength.

ARTICLE 6

1. Housing machines and tackle shall be examined and adequately tasted after erection on the site and before use and be re-examined in position at intervals to be prescribed by national law or regulation.

2. Every chain ring, hook shackle, swivel and pulley block, used in hoisting or lowering materials or as a means of suspension shall be periodically examined.

ARTICLE 7

1. Every crane driver or hoisting appliances operator shall be properly qualified.

2. No persons under an age to be prescribed by national laws, regulations shall be in control of any hoisting machinery including any scaffold which or give signals to the operator.

ARTICLE 8

1. In the case of every, hoisting machine and every chain ring hook, shackle, swivel and pulley block used in hoisting or lowering or as a means of suspension, the safe working load shall be ascertained by adequate means.

2. Every hoisting machine and all gear referred to in the proceeding paragraphs shall be plainly marked with the safe working load.

3. In the case of hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated.

1. No part of any hoisting machine or of any gear referred to in paragraph 1 of this article shall be loaded beyond the safe working load except for the purpose of testing.

ARTICLE 9

1. Motors gearings, transmission, electric wiring and other dangerous part of hoisting appliances shall be provided with sufficient safe guards.

2. Hoisting appliances shall be provided with much moans as will reduce the risk of the accidental descent of the load.

3. Adequate precautions shall be taken to reduce the risk of any part of a suspended load becoming accidentally displayed,

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PART III

GENERAURULES TO SAFETY EQUIPMENT AND FIRST AID

ARTICLE 10.

1. All necessary personal safety equipment shall be kept available for the use of the personsemployed on the site and be maintained in a condition suitable for immediate use.

2. The workers shall be required to use the equipment thus provided and the employer shall take adequate steps to ensure **proper use** of the equipment by those concerned.

ARTICLE 11

When work is carried on proximity to any place where there is a risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger.

ARTICLE 12

Adequate-, provision shall made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

ARTICLE 13

Where large work places arc situated in cities, towns or in their suburban and no beds are considered .necessary owing to the proximity of city or town; hospital, suitable transport shall be provided to facilitate removal of urgent cases to the hospitals, at their work places, some conveyance facilities such as car shall be kept readily available to the injured person or persons suddenly taken seriously ill to the nearest hospital.

MOSAIC FLOORING

1. Cement concrete flooring tiles shall be manufactured from a mixed cement natural aggregates and colour materials where required by pressure process. During manufacture, the files shall be subjected to apressure of not less than 140 kg. persqrn. (or 2000 ibs. sq. inch).

2. Proportion of cement to aggregate in backing of the tiles shall be not less than 1:5 byweight.

3. On removal from mould, the tile shall be kept jn moist condition continuously for at least 7 days and subsequently if necessary kept moist for such a longer period that would ensure their conformity, to the requirements of Transverse, strength, Resistance to wear and tear absorption and would minimize shrinkage and cracking, tiles shall be stored under cover.

1. Tolerance. Tolerance on length and breadth shall be plus or minus one millimetre. Tolerance on thickness shall be plus 5mm. But the range of dimensions any in one delivery of tiles shall not exceed 1 mm on length and breadth and 3 mm on thickness.

5.THICKNESS OF WEARING LAYERS

	Minimum thickness of wearing layer mm
Plain cement and plain coloured tiles for general duty	3
Plain cement and plain coloured tiles for heavy duty	6
(Mosaic) terrace tiles with chips of size varying from the smallest upto 6 mm (1/4")	5
(Mosaic) terrace tiles with chips of size ranging from the smallestupto 12 mm (1/2")	5
(Mosaic) terrace tiles with chips of size varying from the smallest upto 20mm (3/4")	6

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6. Colours and Appearance : The colour and texture of the wearing laver snail be uniform through our its thickness.

7. When specifying the tiles, the contractor should specifically indicate whether the chips to be used are from the smallest units 6 mm or from smallest upto 12mm or from the smallest upto 20mm size. The officers of the department shall also specify size of chips by referring the approximate photograph given in figure 4 to figure 6 in Indian Standard 1237,1959

GENERAL QUALITY OF TILES

8. Unless other wise required the wearing face of the terrace tiles shall be mechanically sound and flat. The wearing face of the tiles shall be plane free from projections depressions and crack (Haircracks not included) and shall be reasonably parallel to the backface of tiles. All angle shall be right angles and all edges shall be sharp and true.

9. Breaking Transverse strength of tiles shall be given as below:

Ste of tiles	Span	Breaking wet test	Load based dry
19.85 x 19.85	15 an	71 kg	106 kg.
24.85 x 24.85	20 an	90 kg	120 kg
29.85 x 29.85	25 an	99 kg	148 kg

10.Theaverage wearof not less than 12 specimens shall not exceed 2 mm and the wear on any individual specimen shall not exceed 2.5 cm when tested in an Abrasion Machine.

11.The average percentage of water absorption on shall not be less than six full tiles shall not exceed ten in the case of water absorption test.

12.The density of the tiles shall be in the order of a about 2.4 gms. The tiles shall be laid' with -the minimum possible width of joint and not exceeding 1/32 inch. The joins shall be filled with grey cement to match the finish of the tiles and shall be made almost invisible when the floors is given the final polish. The polishing shall be done by means of electric polisher wherever possible and hand polish to other places like vertical faces, or wails, covers and other areas where the machines can have no access and to a high degree so as to present a perfectly smooth and glossy surface as oven as possible.

All angles.at junctions of vertical faces shall be rounded off to 11/2" radius with same quality of materials and colour of the tiles of the floor. But laid in situ and these coves shall be measured as part of flooring and laid for at the same rates as the flat floors. The colours of the tiles shall generally match other coloured face adjacent or as may be directed by The Principal, M.D.T. Hindu College, Tirunelveli-10

The doodling and skirting have to be finished by giving necessary recess in the brick wall itself so that the projections does not exceed 3/4" from the face of the wall i.e. the finished plastered surface.

Based on the modulus of rupture of 30 *kg.persq.ft for* dry test and two thirds of the value for wet test.

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GUIDELINES FOR ADOPTION OF STRENGTH GRADEING OF CONCRETE

Plain arid reinforced concrete have been graded according to the cube compressive strength and designated as M100: M 150, M200, M300, M350 and M400. In the designation of concrete the letter "M" refers to the mix and the "Number" to the specified '& day work cube compressive strength of that mix expressed in kg. cm 2

Approximately the 'MI00, M150, M200, M250 grades of concrete corresponds to 1:3:6,1:2:4,1:1/2:3 and 1:1,2 nominal mixes of ordinary concrete currently used, the national Building code gives necessary specification for strength hardening of concrete proportionately and works control and the same may be followed the extract of the same is enclosed.

The proportion of aggregates, cement and water to be used for controlled concrete shall be designed by preliminary tests of the materials to be actually used to obtain the specified strength with the use ofmaximum quantity of cement. However, the maximum total quantity of aggregate by weight per 50 kg.of cement shall not normally exceed -150 kg.

For any particular item compressive strength required to be obtained by the concrete at 28 clays in the preliminary and work tests on the 15 cm cubes, minimum cement content required to be used and the approximate proportions of approved fine and coarse aggregates shall be specified in the tender schedule. These particulars will be only for the guidance of the contractor for quoting rates.

Immediately upon the receipt of the award of contract, the contractor shall inform the Executive Engineer the exact location of the sources of the materials which he proposes to use and get the materials approved. The mix with the actual approved materials to be used shall be got designed in an approved laboratory by the contractor with minimum quantity of cement to give the specified strength in the preliminary tests and the proportions got approved from the Executive Engineer in writing, these proportions shall be used so long as the materials continue to be of the same quality and the same sources subject only to slight changes in the relative qualities of fine and course aggregate for the purpose of promoting workability, provided the works tests also show the required strengths.

If during the progress of work, the contractor wishes to change the materials, the proportions shall be fixed on the basis of fresh preliminary tests to give the required strength after the Executive engineer is satisfied that the materials satisfy the specification. No adjustments of cost shall be made for change of proportions of cement fixed in the original preliminary tests.

PROPORTIONING OF MIX.

Each batch of mix shall be proportioned by weight of cement fine aggregate and coarse aggregate. Water for each batch shall be added in quantity measured by volume or by weight. Where weight of cement determined by accepting the maker weight per bag, a reasonable number of bag shall be weighed separately to check the net weight, and the cement is weighed weight per bag a reasonable number of bags, shall be weighed on the site and not in bags' It shall be weighed separately from the aggregate. All the weighing equipments shall be maintained in a clean and service able condition and their accuracy checked periodically.

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MIXING

Mixing shall be done only by mechanical mixes, the quantities of tine aggregate and' watershall be adjusted duly in the field, to compensate for bulk age due to the quantity of moisture present in fine aggregate and free water in the coarse aggregate at the time of use. TESTS

Tests shall be got done in an approved laboratory at the cost of the contractor.

(A) Preliminary Test

If concrete mixes are specified by its strength then the mix needs be designed and preliminary test should be carried out.

A preliminary test is conducted in a laboratory on the trial mix of concrete produced in the laboratory with the object of:

(a) Designing a concrete mix before the actual concrete operation starts.

(b) Determining the adjustments required in the designed mix when there is a change in the materials used during the execution of works or.

(C) Verifying the strength of cement mix.

(B) Works Test

The' test shall be conducted either in the field or in a laboratory on the sample made on the work spot of the concrete used on the works.

The samples shall be spread as evenly as possible throughout the day then wide changes-of weather conditions occur during concreting additional sample may be taken as desired by the Principal, M.D.T. Hindu College, Tirunelveli – 10.

All expenses on the tests shall be taken in the presence of the Engineer and the contractor or his authorized agent.

All mix design and test data and results shall be maintained as part of the record for the contract and shall be signed by the Engineer and the contractor.

A Register of cement concrete cubes cast and tested giving the following particulars shall be maintained at the site.

1. Name of work and reference to agreement.
2. Serial No:
3. Date and-time of sample taken.
4. Sample No,
5. No.of cube.
6. Identification marks.
7. Proportions of mix.
8. Description of the portion of work represented by {he sample and quantity of concrete represented by the sample.

1. Initials of Assistant Executive Engineer and contractor's authorized agent in whose presence the sample is taken

1. Result of 7 day test.
2. Result of 28 day test.
3. Review and remarks by Executive Engineer.

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EXTRACT OF:

NATIONAL BUILDING CODE OF INDIA 1970PART VI-SECTION 5A :PLAIN AND REINFORCED CONCRETE:

4.2 Grades of concrete.

4.2.1. Plain and reinforced concrete shall be in seven grades designated as M100, M150, M200, M250, M300, M350 and M400.

Note: In the designation of a concrete mix, letter 'M' refers to the mix and the number of the specified 28 days works cube compressive strength of that mix expressed in kg/sq.cm.

4.2.2.1. Where ordinary portland cement or Portland blast furnace slag cement conforming to accepted standards VI-5 (2) * is used The compressive strength requirements for various grades of concrete shall be as given in TABLE 1. Where rapid hardening Portland cement is used, the 28 days compressive strength requirements specified-in Table 1 shall be met at 7 days. Where other cements are used, the Engineer-in-Charge shall specify the corresponding requirements preferably on the basis of preliminary tests.

IS 269/1967 — Specification for ordinary, rapid hardening and low heat Portland cement.

IS 455/1967 — Specification for Portland and blast furnace slag cement.

4.2.2.2. The Strength requirements specified in Table I shall apply to both controlled concrete and ordinary concrete (See 4.3.1) Preliminary tests need not, however, be made in the case or ordinary concrete:

(a) In order to get a relatively quickly idea of the quality of concrete, optional works tests or beams for modulus of rupture at 72 + 2 hours or at 7 days, or compressive strength tests at 7 days may be carried out in addition to 28 day compressive strength test in all cases the 28 day compressive strength test in all cases the 28 day compressive strength specified in Table 1, shall alone be the criterion for acceptance or rejection of the concrete. If however from tests carried out in a particular job over a reasonably long period, it has been established to the satisfaction of the Engineer-in-charge that a suitable ration between the 28 days compressive strength and the modulus of rupture at 72 + 2 hours or at 7 days or compressive strength at 7 days may be accepted. The Engineer —in-charge may suitably relax the frequency of 28 day compressive strength test specified in Table 5 provided the expected strength values at the specified early age are consistently met. For this purpose the value given in table 2 may be taken for general guidance in the case of concrete made with ordinary cement.

(b) Where the strength of a concrete mix, as indicated by test lies between the strengths for any low grades specified in Table 1 such concrete shall be classified for all purposes as a concrete belonging to the lower of the two grades between which its strength lies.

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4.3. PROPORTIONING AND WORKS CONTROL

4.3.1. Methods proportioning – The determination of the proportions of cement aggregates and water to attain the required strength shall be made by one of the following:

With preliminary tests by designing the concrete mix.such concreteshall be called "Controlled Concrete".

(a) Without preliminary tests by adopting nominal concrete mixes Such concrete shall be "ordinary concrete".

4.3.2. CONTROLLED CONCRETE:

4.3.2.1. As far as practicable, controlled concrete should be used on all concrete works. Controlled concrete for use in olain and reinforced concrete structures shall be in grades M100, M150, M200, M250, M300, M350 and M400.

4.3.2.2. The concrete mix shall be designed to have an average strength corresponding. tothe values specified for preliminary tests in Table 1. The propoton chosen should be such that the concrete is' of adequate workability for the conditions prevailing on the work in question, and may be properly compacted with the means available.

The maximum total quantify of aggregate by weight per 50 kg, of cement shall not exceed 450 kg, except where otherwise specifically permitted by the Engineer-in-Charge.

4.3.2.3. Except where it can be shown to the satisfaction of the Engineer-in-Charge that supply of properly graded Aggregate of Uniform quality may be maintained over the period. of work, the grading of aggregate should be controlled by obtaining the coarse aggregate, in different sizes and blending them in the right proportion when required the different sizes being stocked in separate stock piles. The materials should be stock piled for several hours preferably a day before use. The grading of coarse and fine aggregate should be checked as frequently as possible, the frequency for a given job belong determined by the Engineer-in-Charge to ensure that the supplier are maintaining the grading uniform with that of the samples use in the preliminary tests.

4.3.2.4. In proportioning concrete, the quantity of both cement and aggregate should be determined by weight., where the weight of cement is determined by accepting the manufacture's weight per bag, a reasonable number of bags should be weighed separately to check the nett weight. Where the cement is weight on the site and not in bags it should be weighed separately from the aggregates. Water should be either-measured by volume in calibrated tanks or weighed. All measuring conditions, and their accuracy may be periodically checked.

4.3.2.5, It is most important to maintain the water-cement ration constant at its correct value. To this end, determination of moisture contents in both fine and coarse aggregates should be made as frequently as possible the frequency for given job being determined by the Engineer-in-Charge according to weather conditions. The amount of the added water should be adjusted to compensate for any observed variations in the moisture contents. The determination of moisture content in aggregate shall be carried out in accordance with good

practice (VI-5-9) IS 2386 Part iii -1953. To allow for the variation in weight of aggregates due to variation in their moisture content suitable adjustment in the weight of aggregate should also be made.

4.3.2.6. No substitution in materials used on the work or alteration in the established proportions excepts as permitted in 4.3.2.5 shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

4.3.2.7. Workability of the concrete should be checked at frequent intervals. The slump test or where facilities, exist the compacting factor test conducted in accordance with good practice [VI-(10)j may be adopted for this purpose.

4.3.2.8. A competent person should be employed whose first duty will be to supervise all stages in the preparation and placing of the concrete. All works test specimen should be made and site tests carried our under his direct supervision.

4.3.3. ORDINARY CONCRETE:

4.3.3.1. Where it is considered not practicable to use controlled concrete, ordinary concrete may be used for concrete of grades M100, M150, M200, M250. The proportions of materials for nominal concrete mixes for ordinary concrete shall be in accordance with Table 3.

4.3.3.2. In proportioning concrete, the quantity of cement should be determined by weight. The quantities of fine and coarse aggregates may be determined by volume but those should also preferably be determined by weight. In the latter case, the weight should be determined from the volume specified in Table 3 and the weight per liter of dry aggregate. If fine aggregate, is moist and volume hatching is adopted, allowance shall be made for bulking in accordance with good practice (VI-5(9)1*

4.3.3.3. The water cement ration shall not be more than those specified in Table

The cement content of the mix specified in Table 3 for any nominal mix may be increased if the quantity of water in a mix has to be increased to over come the difficulties of placement and compaction, so that the water cement ration specified in Table 3 is not exceeded.

Note: 1. In the case of vibrated concrete, the limit specified may be .suitably reduced to avoid segregation.

Note: 2. The quantity of water used in the concrete mix for reinforced concrete work should be sufficient, but-should not be more that what is sufficient to produce a dense concrete of adequate, workability for the purpose, which will surround and properly grip, all the reinforcement, workability of the concrete should be controlled by maintaining a water cement ration - that is found to give a concrete which is just sufficiently wet to be placed and compacted without difficulty with the means available,

4.3.3.4 Workability of the concrete should be controlled by direct measurement of water content, making allowance for any surface water in the fine and coarse aggregates. The slump test may be conducted in accordance with good practice M-5(11 0)1.*

4.3.3.5. Allowance should be made for surface water present in the aggregate when computing the water content Surface water shall be determined by field, methods in accordance with good practice (VI-5) (9)*. In the absence of exact data the amount of surface water maybe estimated from the values given in Table 4.

4.3.3,6, If ordinary concrete made in accordance with the proportions given for a particular grade does not yield the specified strength due to proper qualities of materials not being available, such concrete **shall be classified as belonging to the appropriate** lower grade.

Ordinary concrete proportioned fora grade giver) in accordance with Table 3 shall not however, be placed in a higher grade on the ground that the test strengths, are higher than the minimum specified . No interpolation shall be,permissible.

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4.4 Sample size and acceptance criteria.

4,4.1. All tests shall be carried our in accordance: -. with good practice f VI-5(4). f

4.4.2. The number of test specimens required, the frequency of sampling and the criteria for acceptance of a concrete a conforming to the specified grade shall be in accordance with table 5 for both ordinary concrete and controlled concrete. No preliminary tests are, however, necessary in the case of ordinary concrete.

IS 1 199-1959-Methods of sampling, and analysis of concrete.

IS 2386 (Part 111) 1963 specific gravity, density, voids absorption and bulking-

Methods of tests for aggregate for concrete.t IS 516-1959-Methods of testfor strength of concrete.

TABLE 1

STRENGTH REQUIREMENTS or CONCRETE

(Clauses 4.2.2.1. and 4.2.2.2.)

(All values in kolcnr)

Compressive strength of 15 cm cubes at 28 days niter mixing conducted in accordance with good practice [VI-5-(4) I

Grade of Concrete (1)	Preliminary test Min (2)	Works Test Min (3)
M 100	135	100
M 150	200	150
M 200	260	200
M 250	320	250
M 300	380	300
M 350	440	350
M 350	440	350
M 400	500	400

Note 1: Preliminary Test: A test conducted in a laboratory on the trial mix of concrete produced in the laboratory with the object of

(a) Designing a concrete mix before the actual concreting operation starts.

(b) Determining the adjustments required in the designed mix when there is a change in the materials used during the execution of work, or.

(a) Verifying the strength of concrete mix.

Note 2: Works Test; A test conducted either in the field or in laboratory on the specimens made on the works, out of the concrete being used on the works.

Note 3: Size of Cubes: In the working test, with the approval of the Engineer-in-charge 10 cm cubes may be used in place of 15 cm cubes provide the maximum nominal size of aggregate does not exceed 20mm. Even the use of 15 cm cubes should normally be restricted to concrete having a maximum nominal size of aggregate not exceeding 40 mm. Where concrete with aggregates larger than 40 mm size is required to be tested, the size of cubes should be specified by the Engineer-in-charge, keeping in view that generally the length of side of the cube should be about four times the maximum nominal size of aggregate in the concrete constituting the cube specimen,

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Note 4: Strength in Relation to Size of the cube: Where 10 cm cubes are used, thevalues obtained from tests on 10 cm cubes shall be reduced to the extent established by comparative preliminary tests with 10 and 15 cm cubes, on in the absence of such comparative tests. by 10 per cent of the value determined from the tests, in order to give the equivalent strength for 15 cm cubes, when cubes larger than 15 cm are adopted generally no modifications is necessary unless otherwise specified by the Engineer-in-charge.

IS 516-1959-Methods of test for strength of concrete.

Note 5: Cylinder strength - Compressive strength test may, with the approval of the Engineer-in-charge, be conducted on 15 cm diameter and 30 Grn high cylinder in accordance with good practice [vi-5(4)*] instead of one cube, where cylinder strength figure given -above shall be modified according to the- formula, Minimum cylinder compressive strength requires, 0.8 compressive strength specified for 15 cm cubes.

'THE CENTRAL ROAD RESEARCH INSTITUTE, New Delhi has carried out tests with a view to establishing a relation between water cement ratio and the compressive strength of concrete using ordinary Portland cements manufactured in the country conforming to accepted standards [VI-5(2)] —

As a result of these, it has been considered advisable to give graphs showing the relationship between the compressive strength of concrete mixes with different water cement ratios and the 7 day compressive strength of cement tested in accordance with good practice [VI-5(2)]." These graphs have been given in Appendix-A as they would be of some assistant in obtaining the water cement ratio for trial mixes of concrete

TABLE 2

OPTIONAL WORKS TEST REQUIREMENTS OF CONCRETE

Clause 4.2.2.2. (a)

(All values in kg/cm`)

All tests shall be conducted in accordance with good practice [VI-5(4)`J.

Grade of	Compressive strength on 15 cm cubes Min at 7 days	Modulus of Rupture by beams test	
		72 + 2	7 days
(1)	(2)	(3)	(4)
M 100	70	12	17
M 150	100	15	21
M 200	135	17	24
M 250	170	19	27
M 300	*200*	*21*	30
M 350	235	23	32
M 400	270	25	34

Note: Notes 3 to 5-under Table 1 arc also applicable to this table. IS 516-1959-Methods of tort for strength of concrete.

IS 269-1967-Specification for ordinary, rapid, hardening and low heat portland cement.

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TABLE 3
CONCRETE MIX PROPORTIONS

Ordinary concrete

Grade of concrete	*Total quantity* of *dry aggregates by volume per 50 Kg. of cement* to be-taken as the sum of the individual volumes of fine and coarse agg'egate.	*Proportion of fine aaareoate to coarse aggregate*	Quantity *of water per 50 kg. of cement* Max.Max.
(1) (2)	(3)	(4)	
	Liters		Liters
M 100	300	Generally 1:2 for fine coarse aggregate	34aggregate to
M 150	220	by volume but subject to an upper limit of 1:1 -'A, 1 :3*	32lower limit of
M 200	160		30
M250,	100		27

Note: It may be noted for general guidance that M 100, M 150, M 200 and M 250 of ordinary concrete correspond approximately to 1:3:6, 1:2:4, 1:11/2:3 and 1:1:2 nominal mixes of ordinary concrete currently used in the country.

"The proportions of the aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger. Example, For an average grading of fine aggregate that is. Zone 11 in accordance with good practice [Vi-5(l)]+ the proportion shall be 1:11/2, 1:2 and 1:3 for maximum size of aggregate 10 mm, 20 mm and 40 mm respectively.

TABLE 4
SURFACE WATER CARRIED BY AVERAGE AGGREGATE

Aggregate (1)	*Approximate quantity of surface water* (2) l/m'
Very wet sand	120
Moderately wet sand	80
Moist sand	40
Moist gravel or crushed work	20 to 40

Coarser the aggregate, less the water it will carry.

t IS 383-1963 Specification for coarse and fine aggregates for natural sources for concrete. IS 516-1959 Specification for natural and manufactured aggregates for use in mass concrete.

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SPECIFICATION FOR SANITARY, DRAINAGE AND WATER SUPPLYARRANGEMENTS

Water closets, basins, u6nals, sinks and other sanitary ware shall be approved Indian make as required in the relevant items. The fixing of these shall be in accordance with the special specification attached.

2. The rates shall include all dismantling, making holes in walls or slabs. and restoring the structure to the original condition after the completion of the work.

3. The work shall be carried out with least hindrance to the adjoining buildings and the contractor shall be responsible for any damage caused to the existing fixtures, electric fitting etc. in the course of execution and the contractor- shall make good such damage without claim for extra.

4.. The rates for laying stoneware Pipes shall include necessary earth work excavation for trenches (irrespective of nature of soil and depth) and all incidental charges such as shoring, Strutting and bailing out water, refilling trenches after the completion of work and consolidating, removing the surplus earth to places shown within the compound and making good the damages to read and other structures.

5. The rates for laying G.I. Pipes shall include earth work for trenching and refilling them *and fixing with wooden plugs, clamps and screws where the pipes are fixed to walls. The rates for* G.I. Pipes shall also include wrapping them with tarred tape where they are hurried in earth tarring the portions embedded in masonry and painting with white paints two coats for port ions above ground level.

5. . The clamps for G.I. Pipes, fitting should not be spaced more than 150 mm. apart. The wooden plugs for pipe and bracket fittings should be properly fixed in C.M. 1:3 in holes made in masonry with the wide and wedge shaped plugs inside and not hammered with them and into walls. The size of plugs should not be less than "Squared" this end and 12 mm. at the other end with a depth not less than 75 mm.

6. New sewer and drains should pass a hydraulic test of not exceeding 3.60 meters at the lowest end.

7. Where a new sewer line is connected to an existing manhole rates quoted shall include necessary excavation-dismantling masonry refilling and redoing the disturbed portions as directed without claiming any extra for those.

5. (a)' Paint with two coats of best white glazed paint or any other colour approved by the Principal over a priming coat of Red lead to all flushing tanks, brackets, clamps used for fixing pipes and all lead connections.

(b) Painting with two coats of anti-corrosive paint of approved colour to all G.I., soil waste and anti-syphone pipes.

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SUPPLYING AND FIXING INDIAN TYPE WATER CLOSETS

11.The Indian Type water closet shall be with 'P' or'S' trap and glazed earthern ware foot rests ftshall be fixed in position of floor level in a bed of concrete brick jelly in 'lime mortar so as to completely embed the closet, trap and foot rests. The existing masonry structure after dismantling the floor making holes etc. shall be restored to its original conditions after completing the work. The flooring round the closet shall be finished off in cement mortar with adequate slope alround for draining into as per the sanitary Engineer's type design.

12.The cast iron flushing tank shall be of 15 liters capacity-of Indian make supported on C.I. brackets with necessary G.I. chains and hands for pull, float ball valve 6 mm. lead and brass connection to the closet including necessary connection to the water main and closet complete and wiped solder . joints. The-flushing tanks and brackets must be painted with white glazed enamel paint 2 coats over a priming coat of red lead. Jhe water closet rooms should be made uptothe foot rest level wherever necessary with brick jelly concrete in lime mortar 1:2.

SUPPLYING AND FIXING EUROPEAN TYPE WATER CLOSETS

11. The water closet shall .be glazed earthern ware with 'P' or'S' trap including PVC seat and cover and chromium plated fittings 15 liters Indian make glazed earthern water flushing tank supported on C.I. Brackets with necessary handle for pull float ball valve 12 mm G.I. telescopic flush pipe connections to the closets including necessary wiped solder joints-complete.
11. The fixing of water closets shall include the dismantling of existing floor wherever indicated making holes in masonry walls etc. and restoring structure to original condition after completion of the work. The flushing tank and-accessories will be fixed to the walls with necessary clamps and brackets ..M, 1:4.

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