



Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance. (Not applicable for subject English and Communication Skills.)
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by the candidate and those in the model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and the model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
Q. 1	(a)	Attempt any <u>THREE</u> of the following:		12
	(i) Ans.	State any four functions of a Junior Engineer. Functions of Junior Engineer (JE): 1. Supervision of work in his charge. 2. Maintain attendance of daily worker, labors. 3. Taking measurement of all work in Measurement Book. 4. Preparation of bills running and final bills for work in his charge. 5. Prepares estimates for all types of works in his section. 6. Carry out field survey for proposed project. 7. Carry out half yearly check of all stores in his charge and submit report to SDO. 8. Report to higher authorities for irregularities in contract, specification. 9. Shortage of supply of department materials or any difficulty during execution.	1 each (any four)	4
	(ii) Ans.	List out any four requirements of a valid contract. Requirements of valid contract: 1. Contract should be in writing and should be signed by both the parties i.e. owner and contractor. 2. The subject matter of agreement must be legal and definite. 3. If situation arises the contract can be enforced in court of law. 4. Parties should be competent enough to carry out work. 5. Both parties must give their free consent to do work. 6. Contract should be attested by responsible officer.	1 each (any four)	4
	(iii)	Differentiate between item rate contract and percentage rate contract.		



Que. No.	Sub. Que.	Model Answers		Marks	Total Marks	
Q. 1	Ans.	Sr. No.	Item Rate Contract	Percentage Rate Contract	1 each (any four)	4
		1.	In this contract, the contractor agrees to work as per the rates quoted by him for each item.	In this contract, the contractor agrees to carry out the work at a certain percentage below or above the estimated cost.		
		2.	This is useful when the quality of work is required and also quantities of work to be executed are not known previously.	This is useful for the work of all nature with no item-wise rates.		
		3.	Suitable for most of public works executed by government departments.	Suitable for all type of government as well as private.		
		4.	It is difficult to prepare comparative statement.	It is easy to prepare comparative statement.		
		5.	Extra items can be cause of dispute	It allows extra items.		
		6.	Contractor can submit unbalanced tender.	No Scope for contractor to submit unbalanced tender.		
(iv) Ans.	Define 'Tender' and list out various types. Tender: The tender is defined as an offer in writing for execution of certain specified work or for supply of specified materials subject to certain terms and conditions such as rates, time limits etc. Types of Tender: 1. Local tender. 2. Global tender. 3. Open tender. 4. Limited tender. 5. Negotiated tender.		2	2 (any four)	4	
(v) Ans.	State any eight conditions when the lowest tender is rejected. Conditions when the lowest tender is rejected: 1. When tender is not submitted in particular form sold by department. 2. The lowest tenderer may lack in experience for work. 3. Earnest money is not enclosed along with tender. 4. Unsatisfactory reputation of lowest tender. 5. In adequate finance to execute work. 6. Inadequate connection of fair rates is not received. 7. Tender is not signed by contractor. 8. If any page is removed from document. 9. If contractors is black listed by any department.		$\frac{1}{2}$ each (any eight)	4	4	



Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
Q. 2		<p>Attempt any FOUR of the following:</p>		16
	(a) Ans.	<p>Define administrative approval and technical sanction.</p> <p>Administrative Approval: For any work, it is necessary to take formal acceptance with respect to cost and work is called as administrative approval. For this the department sends a proposal to government for taking up the work. After considering all aspects like feasibility of project, financial aspect, government accepts proposal.</p> <p>Technical Sanction: Technical sanction means the sanction of the detailed estimate, design, rates and cost of work. It is sanctioned by competent authority. The work is taken for the execution only after the technical sanction. The government has delegated powers of technical sanctions to the officers in PWD.</p>	2 2	4
	(b) Ans.	<p>Draw administrative setup of PWD.</p> <p>Administrative setup of PWD:</p> <pre>graph TD; PWD[PWD] --> SECRETARY[SECRETARY]; SECRETARY --> CE[CE]; CE --> SE1[SE]; CE --> SE2[SE]; CE --> SE3[SE]; CE --> SE4[SE]; SE1 --> EE1[EE]; SE1 --> EE2[EE]; SE1 --> EE3[EE]; SE2 --> AEE1[AEE/SDO/Dy. E.]; SE2 --> AEE2[AEE/SDO/Dy. E.]; SE3 --> JE1[JE]; SE3 --> JE2[JE]; SE3 --> JE3[JE]; JE3 --> SUPERVISOR1[SUPERVISOR (Civil Engg. Asst.)]; JE3 --> SUPERVISOR2[SUPERVISOR];</pre>	4	4



Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
Q. 2	(c) Ans.	<p>State advantages and disadvantages of lumpsum contract.</p> <p>Advantages of lumpsum contract:</p> <ol style="list-style-type: none">1. Total cost of project is known before completion of work.2. Progress of work is fast.3. Owner need not require to appoint staff to maintain accounts.4. Contractor can derive more profit by proper planning.5. Detailed measurement of work is not required except in case of addition and alteration. <p>Disadvantages of lumpsum contract:</p> <ol style="list-style-type: none">1. This method is suitable for small work.2. For extra items contractor may demand higher rates.3. Extra item can be cause of dispute between owner and contractor.4. Quality of work is not assured.5. Contractor may quote higher rate and thus higher tendering is possible.	<p>1 each (any two)</p>	4
	(d) Ans.	<p>Which are the conditions when 'Negotiated Contract' is suitable for work?</p> <p>Conditions when 'Negotiated Contract' is suitable for work:</p> <ol style="list-style-type: none">1. It is suitable when tender is not called for contract.2. The work is given to contractor by mutual negotiation between parties but within selected contractor after studying their previous experience and reputation.3. This type of contract is suitable where time is important.4. This type of contract is suitable where work has to complete at short notice.	<p>1 each</p>	
	(e) Ans.		<p>Define 'Secured advance'. Write maximum limit for it.</p> <p>Secured advance: An advance payment made to the contractor on the basis of the security of materials brought by the contractor to the site of work under construction is called as secured advance.</p> <p>Maximum limit: Authority to make the secured advance is in the hand of Divisional Engineer up to the amount not exceeding 75% of the value of the materials brought to the site by contractor.</p>	<p>2</p> <p>2</p>



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Q. 2	(f)	What is first and final payment? Which form number is used for it?																																																											
	Ans.	First and Final Payment: A single payment made for a small job or small work on its completion is called as “first and final payment”. This type of payment is usually made or applicable for small work only. For example, construction of sanitary block for school building, component wall construction, septic tank construction, ornamental grill work, demolishing existing structure etc. are the examples of small work for which the first and final payment are made to the contractor. Form number 24 is used for it.	3 1	4																																																									
Q. 3	(a)	Attempt any <u>FOUR</u> of the following:		16																																																									
	Ans.	Explain with example ‘Unbalanced Tender’. Unbalanced Tender: In case of unit price contract the contractor has to quote his rate for each item. If these rates quoted by contractor are reasonable, the tender is known as balance tender. But sometimes the contractor puts up higher rates for certain items and lower rates for other items so that the total amount of tender remains practically unaffected, such a tender is known as unbalanced tender. The contractor quotes higher rates for those items which are to be completed in the early part of work so that he gets slightly excessive payment from which he can build up working capital.	2																																																										
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Q. 3		<p>Here the contractor P has quoted very high for Item No. 1 and very low rate for Item No 3. He expects by his judgment and experience after visiting the site, that the quantity of excavation in soft exceeds the estimated quantity double and the excavation in hard rock and soft rock is negligible.</p>		
	(b) Ans.	<p>Define 'Earnest Money'. When it is refunded? Earnest Money: While submitting tender contractor has to deposit certain amount about 1 to 2% of estimated cost with department. This amount is termed as earnest money deposit.</p>	2	
		<p>Refund of Earnest Money: After opening of tender earnest money deposit of all unsuccessful contractors is refunded and of successful contractor it is converted into security deposit.</p>	2	4
	(c) Ans.	<p>Define 'Arbitration'. Why it is needed? Arbitration: The process of settling the dispute between owner and contractor is called as arbitration.</p>	2	
		<p>Need of Arbitration: 1. During execution of work owner and contractor may come across situations where disputes may arise. To settle this disputes arbitration is needed. 2. Arbitration is needed for fair resolution of a dispute by an impartial tribunal or an experienced person.</p>	2	4
	(d) Ans.	<p>List the documents to be submitted at the time of registration as a contractor. Documents required for registration of contractor: The applicant has to submit the following documents along with his application.</p>		
		<ol style="list-style-type: none">1. Latest income tax clearance certificate.2. Proof of financial status.3. Solvency certificate.4. List of machinery with their condition.5. List of technical staff employed along with qualification and experience.6. Professional capacity and experience certificate.7. Attested copies of partnership deed, if any.8. Registration fee.	½ each	4
	(e) Ans.	<p>Suggest the type of contract suitable for: (i) Purchase of office furniture. (ii) Only one contractor for particular work is available in the area.</p> <p>Suitable type of contract: i. Material supply contract. ii. Negotiated contract.</p>	2 each	4



Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
Q. 4	(a)	Attempt any <u>THREE</u> of the following:		12
	(i) Ans.	Enlist various modes of payment to contractor. Following are the modes of payment to the contractor: 1. Interim payment. 2. Advance payment. 3. Secured advance. 4. On account payment. 5. First and final payment. 6. Retention money. 7. Reduced rate payment. 8. Final payment. 9. Mobilization advance.	1 each (any four)	4
	(ii) Ans.	Describe the process of submission of tender. Process of submission of tender: The contractor is required to submit their tender on or before the date and time mentioned by department / authority. Tender is submitted in envelopes marked as I and II. Envelope I: It contains, 1. Covering letter to tender. 2. This envelope contains earnest money deposit in the form indicated in the notice of invitation to tender. 3. Income tax clearance certificate. 4. Solvency certificate from bank. 5. Certificate of registration as contractor. 6. Details of technical personal as contractor. 7. List of work of similar nature and magnitude carried out by tenderer. 8. Details of plants and machinery available. 9. Complete details of work in hand at the time of submission of tender. 10. Details about firm. Covering letter to tender. Envelope II: This envelope contains the priced tender form. Cover: It contains all above two envelopes and it is properly sealed and endorsed on outside face tender for name of project. <i>(Note: Students write three envelopes process of submission of tender should be considered.)</i>	1 2 1	4



Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
Q. 4	(iii) Ans.	<p>Enlist various types of specification and explain any one in detail.</p> <p>Types of specification:</p> <ol style="list-style-type: none">1. Brief specification.2. Detailed specification.3. Standard specification.4. Manufacturers specification. <p>1. Brief specification: The general specification used for estimating the project is the brief specifications. The specification which gives the brief description of various items of work, specifying the materials, quantities, proportion of materials and gives general idea about the whole work.</p> <p style="text-align: center;"><u>OR</u></p> <p>2. Detailed specification: The specification in which detailed information of the various quantities of materials, procedure of workmanship to be adopted, nature and class of work is mentioned. The details specification describes the item of work in details, accurately and complete in all respects in relation to the drawings of the work.</p> <p style="text-align: center;"><u>OR</u></p> <p>3. Standard specification: Detailed specifications for various works are drawn up by an engineering department and these specifications are printed and used as a standard specification. Hence most of the items in works are made to standardized specifications.</p> <p style="text-align: center;"><u>OR</u></p> <p>4. Manufacturers specifications: This type of specifications in which the properties of products such as strength, thickness, depth, elasticity, chemical composition etc. are mentioned.</p>	<p>½ each</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p>	<p>4</p> <p>4</p>
	(iv) Ans.	<p>List out various factors affecting value of a property.</p> <p>Factors affecting value of a property:</p> <ol style="list-style-type: none">1. Forces of demand and supply.2. Cost of construction.3. Increase in population.4. Riots, war, flood and other natural calamities.5. Improvement of public schemes.6. Interest on banks.7. Cost of labour.8. Inflation.9. Monopoly of a property in market.10. Location of property.11. Returns from property.12. Life and age of building.	<p>½ each (any eight)</p>	<p>4</p>



Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
Q. 4	(b)	Attempt any <u>ONE</u> of the following:		6
	(i)	Explain BOT project with respect to objectives, advantages and disadvantages.		
	Ans.	B.O.T. B.O.T. is a form of project where government grants permission to private firm to construct and administrate certain public infrastructure by financing and authorizing them to pay off loans reclaim investment by allowing them to collect tools, fees, rent as stated in contract and after concession period is over, ownership is transferred back to government.	2	
		Objectives of B.O.T. 1. To encourage private investment. 2. To promote foreign investment, techniques and technology in country.	½ each	
		Advantages of B.O.T. 1. Use of private sector financing to provide new source of capital. 2. Accelerate the development of project. 3. Use of latest techniques and machineries for fast completion of projects.	1½	
		Disadvantages of B.O.T. 1. Not suitable for Small works. 2. Transaction costs are high. 3. The success of B.O.T. project depends upon successful rising of necessary finance.	1½	6
	(ii)	What are the points to be confirmed before making final bill?		
	Ans.	Points to be confirmed before making final bill: 1. The junior engineer should certify the satisfactory completion of work. 2. All measurement should be taken accurately. 3. All entries in the measurement book with regards to measurement and quantities of work are checked. 4. The description of item is according to the contract schedule. 5. The quantities executed are according to the sanctioned plans and estimate. 6. Arithmetical calculations of measurement of quantities of item are verified. 7. When the bill is running account, then it is compared with the quantities etc. with the previous bills.	1 each (any six)	6



No.	Que.			Marks															
Q. 5		Returns expected on construction cost @ 12% Returns expected on cost of land @ 8%.																	
		Step 1 : To find cost of plot : Cost of plot = $300 \times 300 = 90,000$	1																
		Step 2 : To find cost of construction : Cost of construction = $150 \times 150 = 2,25,000$	1																
		Step 3 : To find net return : Net Return on construction @ 8% = $\frac{8}{100} \times 90,000 = 7,200$ Net Return on plot @ 12% = $\frac{12}{100} \times 2,25,000 = 27,000$ Total Net Rent per year = $7200 + 27,000 = 34,200$	3																
		Step 4 : To find gross rent : Assuming Gross Rent = G Gross Rent = Net Rent + Outgoings $G = 34200 + \left[\frac{30}{100} \times G \right]$ $\therefore G = 48857.14$	2																
	Step 5 : To find rent per month : $\therefore \text{Rent per month} = \frac{48857.14}{12}$ $= 4071.42 \cong 4072$ $\therefore \text{Rent per month is Rs. 4072/-}$	1	8																
	(c) Differentiate between Market value and book value																		
	(i) Ans.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sr. No.</th> <th style="width: 40%;">Market Value</th> <th style="width: 50%;">Book Value</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>It is the value or amount of a property, which may be obtained at any time from the open market.</td> <td>It is the value or amount mentioned in the account book at the time of purchase and can be obtained on deduction done by depreciation.</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Market value is not readily available.</td> <td>Book value is readily available.</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Frequency of fluctuations are frequent.</td> <td>Frequency of fluctuations are not frequent.</td> </tr> <tr> <td style="text-align: center;">4.</td> <td>When market value is greater than book value there is loss.</td> <td>When book value is greater than market value there is profit.</td> </tr> </tbody> </table>	Sr. No.	Market Value	Book Value	1.	It is the value or amount of a property, which may be obtained at any time from the open market.	It is the value or amount mentioned in the account book at the time of purchase and can be obtained on deduction done by depreciation.	2.	Market value is not readily available.	Book value is readily available.	3.	Frequency of fluctuations are frequent.	Frequency of fluctuations are not frequent.	4.	When market value is greater than book value there is loss.	When book value is greater than market value there is profit.	2 each (any two)	
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Q. 5	(ii) Ans.	<p>Depreciation and Obsolescence</p> <table border="1"> <thead> <tr> <th data-bbox="375 280 454 347">Sr. No.</th> <th data-bbox="454 280 821 347">Depreciation</th> <th data-bbox="821 280 1212 347">Obsolescence</th> </tr> </thead> <tbody> <tr> <td data-bbox="375 347 454 571">1.</td> <td data-bbox="454 347 821 571">The physical loss in the value of the property caused by its use life, wear, tear and decay, is called as depreciation.</td> <td data-bbox="821 347 1212 571">The loss of the property because of change in fashion, style, new inventions, modern facilities etc. is called as obsolescence.</td> </tr> <tr> <td data-bbox="375 571 454 761">2.</td> <td data-bbox="454 571 821 761">Depreciation depends upon the age of the property. More is the life; more will be the depreciation.</td> <td data-bbox="821 571 1212 761">Obsolescence do not depends upon the age of the property. The reduction in the value of the property may be sudden.</td> </tr> <tr> <td data-bbox="375 761 454 873">3.</td> <td data-bbox="454 761 821 873">Depreciation can be determined by various methods.</td> <td data-bbox="821 761 1212 873">Obsolescence cannot be calculated or determined by only method.</td> </tr> </tbody> </table>	Sr. No.	Depreciation	Obsolescence	1.	The physical loss in the value of the property caused by its use life, wear, tear and decay, is called as depreciation.	The loss of the property because of change in fashion, style, new inventions, modern facilities etc. is called as obsolescence.	2.	Depreciation depends upon the age of the property. More is the life; more will be the depreciation.	Obsolescence do not depends upon the age of the property. The reduction in the value of the property may be sudden.	3.	Depreciation can be determined by various methods.	Obsolescence cannot be calculated or determined by only method.	2 each (any two)	8
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Q. 6	(a) Ans.	<p>Attempt any <u>FOUR</u> of the following:</p> <p>(a) Draft the detailed specification for M20 grade of concrete in footing and column.</p> <p>1. Proportion: Proportion of 1: 1.5: 3 shall be adopted by taking one part of cement, 1.5 parts of sand or fine aggregates and three parts of coarse aggregate by volume.</p> <p>2. Concrete Ingredients:</p> <p>Cement: Cement shall be measured by weight as per the standard requirements.</p> <p>Fine Aggregate: The sand shall be free from impurities like dust, clay, oil etc. It shall be well washed before use.</p> <p>Coarse Aggregate: The coarse aggregate shall consist of 67% of size from 20mm to 40mm and 33% size from 20mm to 6mm. The coarse aggregate shall also be free from impurities like clay, dust, oil and organic material.</p> <p>Water: The water shall be clean, fresh and drinkable.</p> <p>3. Steel: Steel reinforcing bars used in concrete shall be of mild steel or deformed steel as per the standard specifications and shall be free from corrosion, loose rust scales, paint, grease, oil etc. Joints in the bar shall be prevented. When joints have to be made, then an overlap of 40 times diameter of the bar shall be given. Bigger diameter bars shall be joined by welding. Proper cover shall be maintained for steel bars, so as to prevent from exposing to atmosphere.</p> <p>4. Concreting Operations:</p> <p>Mixing: The mixing of concrete shall be done in a mechanical mixer for large scale concrete or by hand operation for small scale concrete work.</p> <p>Form work: The formwork shall be oiled from inside before concreting the formwork. The concrete shall be laid in the forms and tapped in such manner that no honeycomb surface shall appear on removal of the forms.</p>		16												
Que. No.	Sub. Que.	Model Answers	Marks	Total Marks												



<p>Q. 6</p>	<p>The formwork and centering shall be made of dressed timber of well-seasoned wooden boards to give a smooth and even surface and the joints shall not allow leakage of cement paste.</p> <p>Laying of concrete: Concrete shall be laid continuously, if laying is suspended for rest, then end shall be sloped at an angle of 30° and made rough for proper bonding and key. When the work is resumed, the previous sloped portion shall be made rough, clean and watered. A coat of neat cement paste shall be applied on this roughened portion and fresh concrete shall be laid.</p> <p>Compaction: Concrete shall be compacted by mechanical vibrators so as to have a dense concrete. Over-vibration shall be prevented. Hand compaction shall be done with the help of punning rods and tamping rods and tamping with the wooden tampers so that concrete is thoroughly compacted and completely walked into the corners of the form work.</p> <p>After removal of the form work, the concrete surface shall be free from any defects such as honey combing, air holes, cracks etc.</p> <p>Curing: Freshly laid concrete shall be protected from direct sun, rain etc. When the concrete is set or harden about 2 hours after its laying, it shall be protected with gunny bags.</p> <p>After 24 hours of laying; the concrete surface shall be cured by flooding with water by making small ponds. The minimum period for curing shall be 14 days.</p> <p>5. Measurement: Length, breadth and depth or thickness shall be measured correct to a cm and the consolidated cubic contents of the concrete shall be calculated net to the nearest 0.01 cubic meter. Concrete laid in excess of the dimensions shown in the drawings shall not be measured.</p> <p>(b) What are the points to be observed while framing the specification?</p>	<p>4</p>	<p>4</p>
<p>Que. No.</p>	<p>Sub. Que.</p>	<p>Marks</p>	<p>Total Marks</p>
<p>Model Answers</p>		<p>1 each (any four)</p>	<p>4</p>



<p>Q. 6</p>	<p>9. The subject matter mentioned in the specification should relate to the information required when the contract is given to the contractor.</p> <p>10. Unfair specifications are not desirable, meaning that throwing all the possible risks on the shoulders of contractors is unfair and hence such specification should not be mentioned.</p> <p>11. The sentences of the specification should be simple and short so as to avoid the risk of legal difficulties and allegations.</p> <p>12. Specifications of various items should be framed by keeping the practical limitations of materials and workmanship in mind.</p> <p>(c) What are the legal aspects of specification?</p> <p>Ans.</p> <ol style="list-style-type: none">1. Specification of various items becomes the important documents as per as legal aspect like contract and agreements are concerned. Hence the drawing and specifications are two important contract documents considered as a legal documents.2. The tender documents and agreements towards legal aspect are incomplete and invalid without specifications.3. Specifications have more legal strength and hence most of the contract state that in case of discrepancy between the drawings and specifications, the specification act as a legal proof.4. In case of disputes between the owner and the contractor, specifications act as a useful legal documents to solve the problem in between two party. <p>(d) List out any eight purposes of valuation.</p> <p>Ans.</p> <ol style="list-style-type: none">1. Buying and selling the property.2. Taxation.3. Rent fixation.4. Security of loans or mortgage.5. Compulsory acquisition.6. Insurance.7. Wealth tax and estate duty.8. Assessment of stamp fees.9. Gift tax.10. Partition. <p>(e) Define sinking fund and years purchase.</p> <p>Ans.</p> <p>Sinking Fund: Fund created by regular periodic payments which accumulate at the compound interest is a sinking fund. Amount of sinking fund is used at the end of utility period of the structure.</p> <p>Years Purchase: Years purchase is the capital sum required to be invested so as to receive an annuity of Rs. 100, at certain rate of interest.</p>	<p>1 each</p> <p>$\frac{1}{2}$ each (any eight)</p> <p>2</p> <p>2</p>	<p>4</p> <p>4</p> <p>4</p>
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