SUMMER – 16 EXAMINATIONS

Subject Code: **17557** **Model Answer** Page No: ____/ N

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 candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.

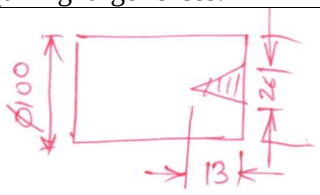
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.

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.

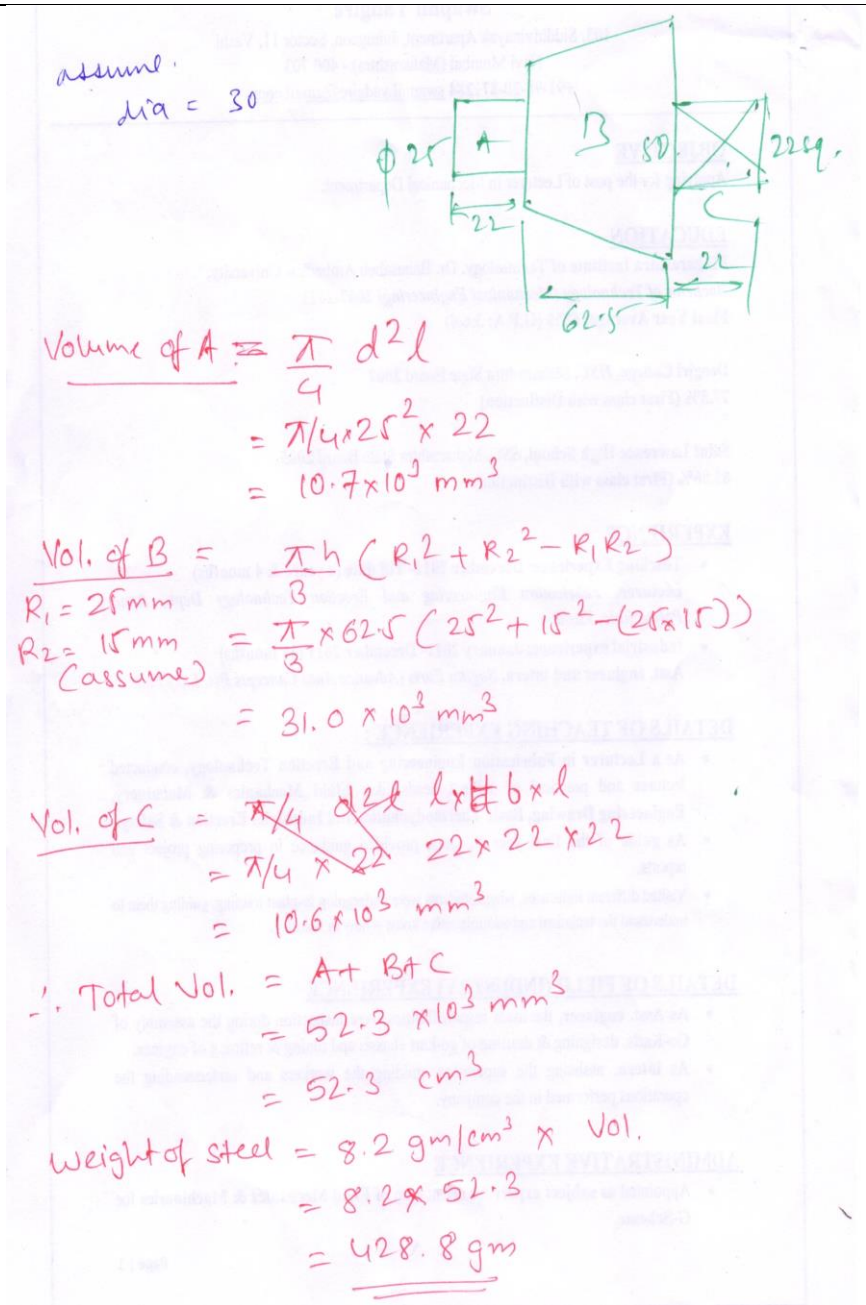
Q. No.	MODEL ANSWER	Marks	TOTAL
1	**Attempt any 5**	**4M Each**	**20M**
Ans a)	Costing has been defined by Institute of Cost and Works Accountants, England as: " The technique and process of ascertaining costs" It is the determination of an actual cost of an article, after adding different expenses incurred in various departments. Objectives: • To determine cost of article • To determine cost of incurred during each operation • To provide information to ascertain selling price of product • To supply info for detection of wastage • It helps in reducing total cost of manufacturing • It suggests, changes in design, when cost is higher • To help formulating the policies • To provide info for economic consideration for purchasing new machines • To help management in decision making • To facilitate preparation of estimate for tender • To compare actual cost with estimated cost.	**2M(any def.)** **2M objectives (atleast 4)**	**4M**
Ans b)	AVERAGE PRICE METHOD: In this method avg. cost of the material is charged for the product. The two methods commonly used are; i) Simple average method – It means the avg. cost of material in hand on the date of issue from stores. Each time, when the material is issued, avg. cost is calculated. Therefore, new calculations are necessary after every entry to obtain the mean price. ii) Month end average method – In this method avg. cost of each type of material is calculated at the end of each month and is charged for all the issues during the following months.	**2M each pt.**	**4M**
Ans c)	i) Depreciation: Efficiency and value of machine or asset reduces with the lapse of time during use this is called depreciation. Generally money is kept aside known as 'sinking fund' ii) Obsolescence: Reduction in the value of existing machinery or asset due to new and better invention or design of equipment or process etc. i. Depreciation due to wear and tear. Everybody knows that when any machinery performs work, wear and tear of certain components takes place. Cost incurred due to this is value of depreciation due to wear and tear ii. Depreciation due to physical decay. There are certain items in a factory, such as, insulation of material, furniture, electric cables, poles, buildings, chemicals and vessels etc., which get decay because of climatic condition. This reduction in value is	**1M each def.** **2M causes Any 2**	**4M**

	depreciation due to physical decay iii. Accidental depreciation. Accident may occur due to some wrong operation or some loose component or some other cause, which result in heavy damage. The depreciation due to this is accidental depreciation. iv. Depreciation due to deferred maintenance and neglect. If proper maintenance is not done as recommended by manufacturer, then the value of the machine or vehicle may be reduced and depreciation value because of this is called depreciation due to deferred maintenance and neglect. v. Inadequacy. Inadequacy means reduction in efficiency of an asset. This may result in the production. Also if the demand of the product increases there is a need for bigger or another machine of similar size. This cost is called depreciation due to inadequacy. vi. Depreciation by obsolescence. If new machinery comes in market, better and cheaper than existing one, hence the existing machinery has to be replaced to withstand market competition. This is called as depreciation by obsolescence.		
Ans d)	Qualities of Estimator i. He must be able to read and understand drawings and blue prints well. ii. He must have good knowledge of different machines, their operations iii. He should have good knowledge for use of proper tools, jigs and fixtures. iv. He must have good knowledge of market prices v. He must have good knowledge about the wage rates. vi. Should have knowledge about different allowances. vii. Should have good knowledge about cutting speeds, feeds and depths of cuts for different materials. viii. Must be well qualified and trained technical person. Able to suggest new methods. ix. He must know official account classification. x. Must know the procedure of "time and motion study" xi. Should also have knowledge about business matters. xii. Must co-operate with other departments.	**1M each pt.**	**4m**
Ans e)	There are certain factors which affect largely on the welding cost. These factors are as follows. i. Time required for handling and setting the job and equipment in correct position ii. Time required for fixing fixtures. iii. Rest and fatigue time allowance. iv. Excessive welding. v. When excessive current is used, welding cost also increases.	**1M each pt.**	**4M**
Ans f)	Hand forging: When the forging is done by hand,the process is known as hand forging. In case of heavy jobs, smith is assisted by a hammer-man. Important	**2M each**	**4M**

	hand forging operations are drawing, upsetting, bending, punching, swaging and shearing etc. Machine forging: the process in which forging is done by machines are known as machine forging. Machine forging is useful for heavy and complicated job requiring large forces.	**pt.**	
Ans g)	 Vol. of groove = Area of base x $\frac{\text{Perpendicular height(H)}}{3}$ $= 26 \times 26 \times \frac{13}{3}$ $= 2929.33\ mm^3$ $= 2.93\ cm^3$ Total weight = Vol. x density $= 2.93 \times 7.7\ gm/cm^3$ $= 22.56\ gm$		**4M**

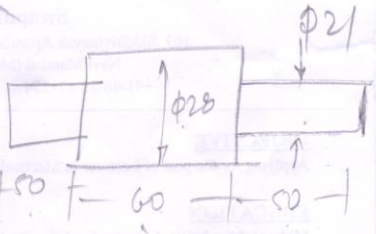
Ans h)	Inflated price method: in this system, the charged cost of the material is slightly raised (inflated) by small percentage of the actual purchase price. All other methods have not taken into account the wastage of material in stores, which is unavoidable. Therefore certain percentage is charged for normal wastage on the purchase price. Thus cost of material issued is raised by some percentage to recover the wastage cost.	**1M each pt.**	**4M**
2.	Attempt Any two	**8M each**	**16M**
Ans a)	selling price = Rs 15000/- Direct mat. cost : labour cost : expenses = 2:3:2. Factory overhead = 50% of prime cost selling expenses = 10% of price cost Profit/factory cost = 0.4. Soln = S.P = Profit + Total cost Prime cost = 7x. Factory overhead = 3.5x. Factory cost = 10.5x. office cost = 15.75x Profit = 0.4 * factory cost = 0.4 x 10.5x = 4.2x ∴ ~~Total~~ S.P = 4.2x + 15.75x 15,000 = 19.95x ∴ x = Rs 751.87 ∴ Total cost = 15.75 x 751.87 = Rs 11842.10 Direct material cost = 2x = 2x751.87 = Rs. 1503.7 Labour cost = 3x = 3 x 751.87 = Rs. 2255.6 Expenses = 2x = 2x 751.87 = Rs. 1503.7		

Ans b)	Fixed price method: In this method, issued material is charged at a predetermined estimated price, for a fixed period. Mostly for one year one rate is charged. Therefore, receipts and issues are recorded in quantities only which make store-keeping easy. This method is also known as "Standard Price" method. Price is generally fixed on the basis of past experience and future trends. **Application.** This system is mostly used where the fluctuations in the market price are very less and few. Surplus waste control: these are the materials and equipments which have no immediate use but have accumulated due to faulty planning, forecasting and puchasing. However these may have usage value in future	**4M** **4M**	**8M**
Ans c)	i) Sinking fund method:in this system, a depreciation fund equal to actual loss in the value of the asset or machine is estimated, taking into account the interest on the so accumulated fund. The rate of depreciation will be constant throughout the life of the machine. *Let,* $D = rate\ of\ depreciation\ per\ year$ $R = Rate\ of\ interest\ on\ depreciated\ fund\ in\ fraction\ number$ $C = Total\ cost\ of\ machine$ $S = Scrap\ value$ $N = no.of\ years\ of\ life\ of\ machine$ $D = \frac{R(C-S)}{(1+R)^N - 1}$ ii) Sum of year's digit method:In this as new equipment is installed the reduction in value will be greater initially and it will go on decreasing gradually. This fact is taken into account and therefore greater amount of depreciation is charged during early years of life and it goes on reducing as the life of equipment decreases. Therefore, for calculating depreciation the net amount. (Total cost – Scrap value) is spread over whole life in decreasing proportion.	**4M** **4M**	**8M**
3.	Attempt any two	**8M each**	**16M**
Ans a)	Qualitites of estimator: i. He must be able to read and understand drawings and blue prints well. ii. He must have good knowledge of different machines, their operations iii. He should have good knowledge for use of proper tools, jigs and fixtures. iv. He must have good knowledge of market prices v. He must have good knowledge about the wage rates. vi. Should have knowledge about different allowances.	**1M each pt.**	**8M**

	vii. Should have good knowledge about cutting speeds, feeds and depths of cuts for different materials. viii. Must be well qualified and trained technical person. Able to suggest new methods. ix. He must know official account classification. x. Must know the procedure of "time and motion study" xi. Should also have knowledge about business matters. xii. Must co-operate with other departments.		
Ans b)	 Volume of A = $\frac{\pi}{4} d^2 l$ $= \pi/4 \times 25^2 \times 22$ $= 10.7 \times 10^3 \text{ mm}^3$ Vol. of B = $\frac{\pi h}{3}(R_1^2 + R_2^2 - R_1 R_2)$ $R_1 = 25\text{mm}$ $R_2 = 15\text{mm}$ (assume) $= \frac{\pi}{3} \times 62.5 (25^2 + 15^2 - (25 \times 15))$ $= 31.0 \times 10^3 \text{ mm}^3$ Vol. of C = ~~$\pi/4$ d² l~~ l × b × l $= \pi/4 \times 22$ 22 × 22 × 22 $= 10.6 \times 10^3 \text{ mm}^3$ ∴ Total Vol. = A + B + C $= 52.3 \times 10^3 \text{ mm}^3$ $= 52.3 \text{ cm}^3$ Weight of steel = 8.2 gm/cm³ × Vol. $= 8.2 \times 52.3$ $= 428.8 \text{ gm}$		

Ans c)

original dia = 35 mm
cutting speed = 15.4 m/min
feed = 1 mm/rev
all cuts 3.5 mm deep



$S = \frac{\pi D N}{100}$ N = rev/min
F = feed/rev
D = dia.
S = cutting speed.

time = $\frac{L}{Feed}$

$T = \frac{Length}{feed} = \frac{L}{F \times N}$.

$N = \frac{100 S}{\pi D}$ L = length min

$S = \frac{\pi D N}{100}$ S = m/min
D = dia in cm
F = feed/rev
N = rev/min.
D = 35 mm.

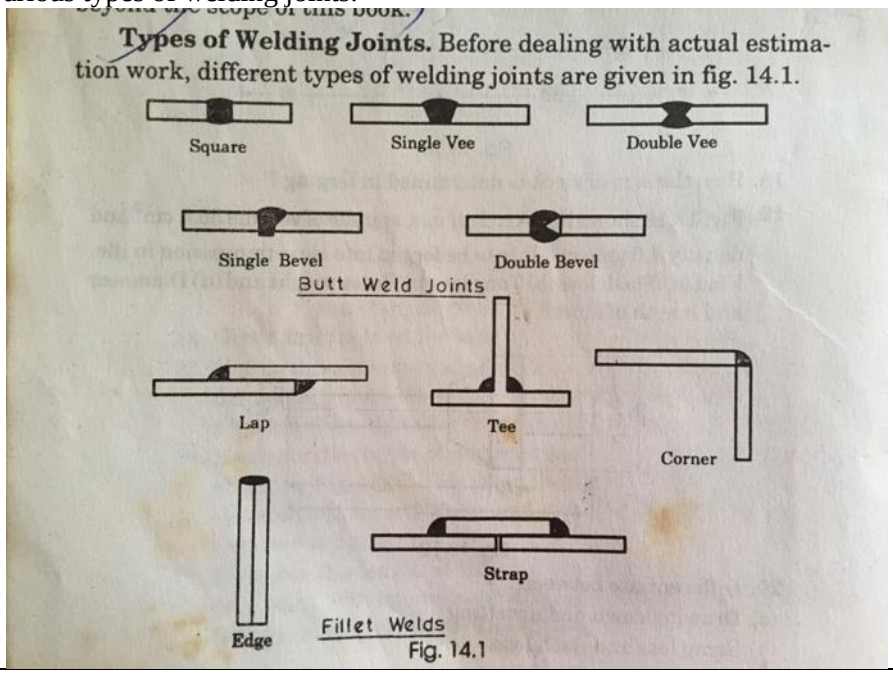
$N = \frac{100 \times 15.4}{\pi \times 2.8}$

$N = 175.07$

$T_1 = \frac{150}{1 \times \frac{100 \times 15.4}{\pi \times 2.8}} = \frac{L}{F \times N}$.

$T_1 = 0.57 T = \frac{160 \times 10}{1 \times \frac{100 \times 15.4}{\pi \times 3.5}} = 1.14$ min.

T = 1.71 min.

4.	Attempt any two	**8M each**	**16M**
Ans a)	Various types of welding joints:  	**1M each**	**8M**
Ans b)	Blank Lay-outs: For preparing an article, layout is required to be done on the sheet metal as first step. For this purpose an outline of the object is either scratched on the sheet of metal directly or first drawn on a paper and later transferred to the sheet. Sheet is cut in accordance with layout and then different other operations like forming assembling etc. are performed on it to give the required shape of operations like raising, wiring, jointing, hemming etc. Estimation of time. Before proceeding to actual operation, strip is to be picked up, entered in dies and process is started, these preparation items generally require 15 sec for small strips to 30 sec for heavy strips. Actual operations are generally performed in presses, either having automatic feeding arrangement or manual feeding. After blanking operation is over 10 -15 sec per strip are required for collecting the blanks and disposing the bridges	**4M** **4M**	**8M**
Ans c)	Estimating erection cost: At the job site, the main function of the erection team is to receive the components, store them, protect them from damage, preserve them during storage to sustain the original condition and assemble them with the permissible limit/tolerance specified in the standards handbooks to achieve determined performance during operation. Around 5600MT of pressure parts components per unit are dispatched loose to the job site by road/rail. Hence, it becomes all the more important for the job site erection team to take utmost care right from the receipt stage to	**4M**	**8M**

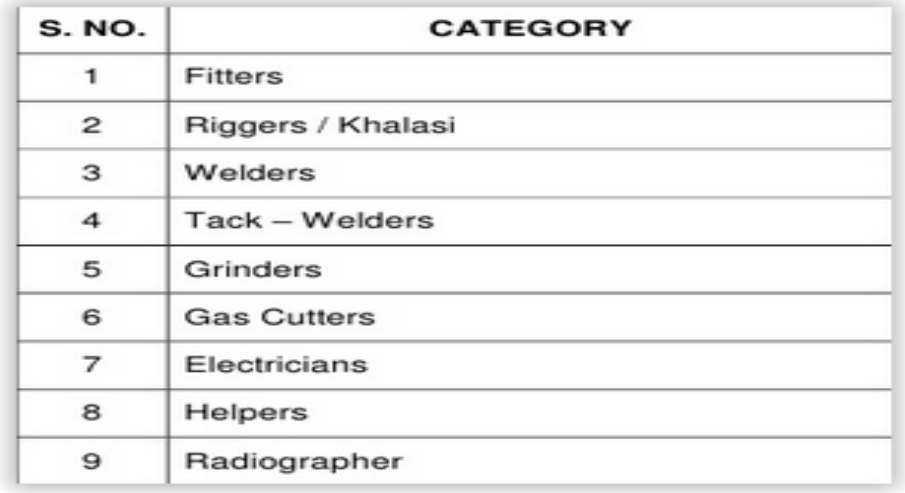
completion of erection, so that commissioning activities proceed without any difficulties. A project gets completed successfully only when the 3 M's viz. Men, material and machines/devices associated with it are well co-ordinated and accounted for. Hence, elements for costing involves;

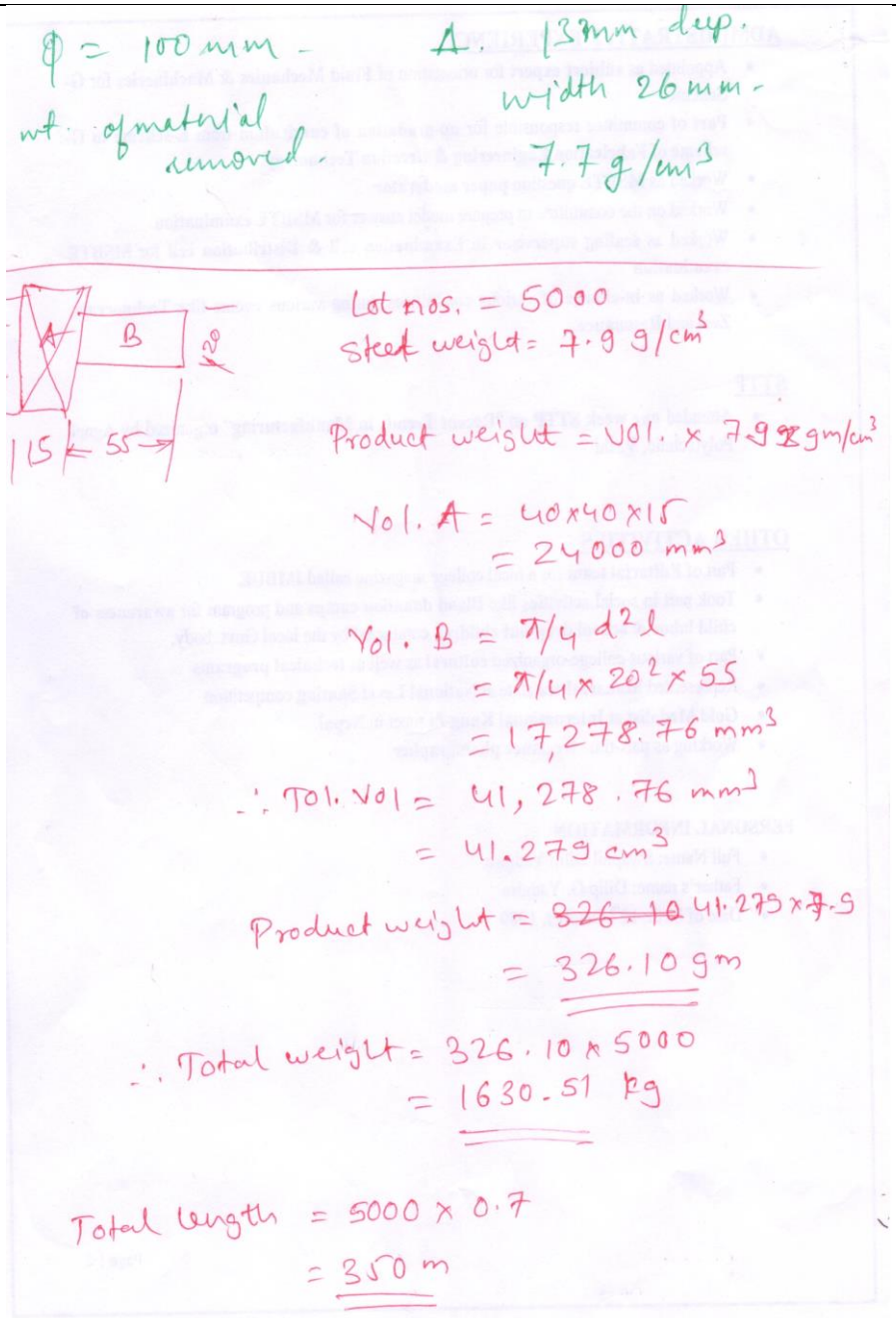
i) The machines/devices associated during a typical erection work are listed below for reference which may be fully owned by the concerned party but are usually preferred on hire basis

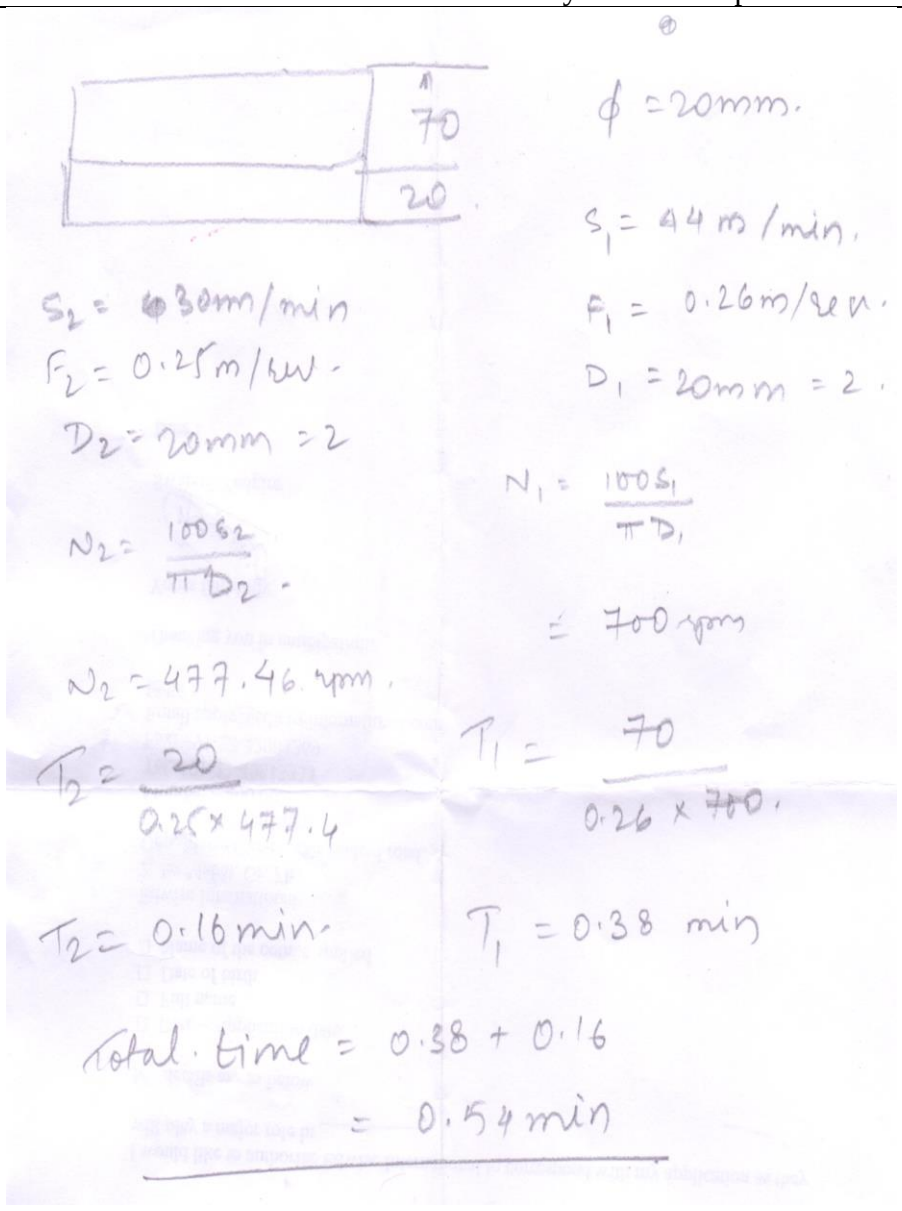
4M

S. No.	Description
1.	Electric winch 10 ton capacity (for drum)
2.	Electric winch 3 or 5 ton capacity (for U rod)
3.	Wire Ropes 1400 M length, 25 mm dia. 6 x 37 construction IWRC and right lay (for Drum)
4.	Wire rope 400M length, 19 mm dia. 6 x 37 construction, IWRC and right lay (for U rod)
5.	10 sheeve 100 ton pulley block
6.	Single sheeve 10 ton pulley block
7.	3 ton or 5 ton chain pulley block
8.	3 ton pulling and lifting machine
	Or
9.	Wire rope 26 or 28 mm dia. 6 x 37 construction and IWRC. a) 40 mm length for lashing 10 sheeve pulley with cat band structure b) 80 M length for lashing 10 sheeve pulley with drum.
10.	Forged steel bull grips to suit the dia. Of rope

ii) The men in the team may comprise of technical officers of the parent company but third party expertise (on contract basis) may also be utilised along with in house and other contract labour as listed below:

	 The material viz. the pressure vessel concerned may be required to be prepared for erection phases viz. Hauling, hoisting, etc. for which additional components may be needed and attached as per on site conditions in addition to such similar functional parts provided on the vessel during fabrication stage. With this knowledge the stages of erection could be pre planned and applying the basics of costing the cost estimation may be forecast for the above erection project. The figure next shows the basic **cost elements** associated in estimation costing problems.		
5.	Attempt any two	**8M each**	**16M**

Ans a)			
Ans b)	Process accounting: Following are the characteristics of process cost accounting • The output consists of product which are homogenous • Production is carried on in different stages having continuous flow • Production takes place continuously except in cases where the plant and machinery are shut down for maintenance etc. • The input will pass through two or more processes before it takes shape of the output.	**2M each**	**8M**

	• The output of the process may also be saleable in which case the process may generate some profit. • The input of process may be capable of being acquired from outside sources. • The output of a process is transferred to next process generally at the cost of process. • Normal and abnormal losses may arise in the process		
Ans c)			

6.	Attempt any four	**4M each**	**16M**
Ans a)	Although estimating and costing both are required to decide the price of the product, even then the two are different as explained below : 1. Estimation is aimed to calculate the probable cost of the product before the manufacturing starts, and while costing is the determination of actual cost of the product by adding various elements of expenses incurred. 2. Estimation requires a highly technical knowledge hence an estimator is basically an engineer and costing requires the knowledge of accounts and, therefore, costing is done by accountants. 3. Estimation forecasts about the probable cost and hence one can know before the manufacture that the manufacturing of the product shall be profitable or not, and whether one should manufacture it or not, but costing tells after the manufacture about the profitability of the product. 4. Estimation is about forecasting or predicting the probable cost of a product whereas costing is the ascertainment of actual cost incurred	**1M each**	**4M**
Ans b)	Direct labour : the workers, who actually work or process different materials manually or with the aid of machines is known as 'direct labour'. This is also clled as productive labour. The nature of their duties is such that their wages can be directly charged to the job which they are manufacturing. Workers engaged for operating on various production machines in machine shop, welding shop, pattern making shop, assembly shop etc. Indirect labour : any other labour who helps the productive labour in performing their duties is known as indirect labour. The nature of their duties is such that their wages cannot be charged directly to a particular job but are charged on the total number of products produced in the plant during particular period. Foreman, supervisors, inspectors, chowkidars, gate-keepers, store-keepers, crane drivers and gangmen etc. are classified as indirect labour.	**2M** **2M**	**4M**
Ans c)			