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PROGRAM	:	B. Tech *CIVIL ENGINEERING*
SUBJECT	:	**Contract Management**
CODE	:	**CMC411**
DATE	:	EXAMINATION 2014 31 MAY 2014
DURATION	:	(SESSION 1) 08:30 - 12:30
WEIGHT	:	40 (Year Mark): 60 (Exam.)
TOTAL MARKS	:	100

ASSESSOR	:	Tobie Louw
MODERATOR	:	Lourens de Koning
NUMBER OF PAGES	:	9 PAGES AND 9 ANNEXURES

INSTRUCTIONS	:	ONLY ONE POCKET CALCULATOR PER CANDIDATE MAY BE USED.
REQUIREMENTS	:	For the O & O and BOQ questions students MUST use the applicable sheets attached.

INSTRUCTIONS TO STUDENTS

Note the following:
- This is an open book examination.
- Students are not allowed to use mobile phones for any purpose whatsoever.
- Make use of bullet or a numbering format where appropriate.
- If and where appropriate, make use of sketches or diagrams to illustrate your answers
- In a number of questions, students are required to apply their minds on how to handle the specific situation and it should be noted that points will and should be given for various aspects, not necessarily in terms of a strict pre-determined memorandum only. Innovative answers will be rewarded as well as valid answers that are deemed reasonable
- Keep answers as condensed /short as possible.
- Please answer only 4 of the 5 questions.

QUESTION 1 (On next page)

CMC 411 CONSTRUCTION MANAGEMENT IV
EXAMINATION – 2014   Duration : 4 hours

Question 1 -   Unit Rates - Cost of Concrete for Building Floor

The requirement is to compile a unit rate (R/m^3) for the casting concrete for the floors of a Building Complex.

1. Allow for a 10% Company "Profit" in you final answer,
2. All prices for the purchase of Equipment and Material will be inclusive of VAT. Do not allow for VAT in you answer.
3. The cost of all the "Other Equipment" and "Hand Tools" will be R 72960.00
4. The price of the "Other Equipment" and "Hand Tools" will be written off over the volume of concrete for the contract.
5. The volume of 7182 m^3 concrete will be the total volume of concrete for all the floors in this contract.
6. The total team will consist of:
    - i)   2 Supervisor @ R 60.00 / hour
    - ii)   16 Helpers @ R 20.00 / hour
    - iii)   8 machine Operators @ R 40.00 / hour
7. Special Concrete mix "Pump Mix" will be used of grade 30/19 @ R 1450.00 / m^3
8. The concrete surfaces need to be "Stricken" off, and have a "Hardened" surface finish.
9. Cost of setting up and dismantle, the concrete pump and support equipment is R 2850.00 each time.
10. The shuttering will be hired at a price of R 1140 – 00 per shift.
11. During the mornings, while the "Concrete Placing Team" is casting and compacting the concrete the "Finishing Team" will do the Stripping, Cleaning and Erection of the Shuttering for the next pour.
12. The "Concrete Placing Team" will stop working the moment the last concrete is placed on the deck for the shift.
13. The "Finishing Team" will do the compaction of the last concrete before they start with the finishing.
14. Cost of pumping the concrete is @ R 17.10 / m^3
15. The normal hours of work is from 07h00 until about 17h00 or until the placing of concrete and /or the finishing is completed. This will be each day for 5 days per week.
16. All employees will start at 07h00 each morning and first do "Toolbox talks" meeting for 30 (thirty) minutes.
17. The concrete "Hardening Substance" costs R 57 .00 (Fifty seven) per liter and covers 4.5 m^2 per liter.
18. For the casting process the team consists of:
    - i)   1   Supervisor
    - ii)   12 Helpers
    - iii)   4   Machine Operators
19. For the finishing process the Team will consists of:
    - i)   4 Helpers
    - ii)   1   Supervisor
    - iii)   Do the striking off
    - iv)   Do the Tamping down and apply the "Hardening Substance" to the floor and finish to Engineers specification
    - v)   Area of each cast, and to be tamped is 20.0 (twenty) m wide and 25.0 (twenty five) m long.
    - vi)   The floors are 252 (two hundred and fifty two) mm thick.
    - vii)   The "Finishing" team will work for an additional 2 (two) hours each day, after the main concrete placing gang has completed.
20. The Production Rate of the supply and pumping of concrete on site is 4.421 (four point four two one) m^3 in every 20 (twenty) minutes.
21. A Supervisor will be available for each of the teams and will work the same hours as the tams being supervised.
22. Note that the "Finishing" team will only do finishing work, and the same applies to the "Casting" team.
23. The volume of concrete to be placed is 126 (hundred and twenty five) m^3 per shift
24. The Concreting to the concrete deck will start at 07h30 each morning.
25. Despite an extended day the operation must be completed in a shift period.
26. The Overtime (OT) rate is 40 % more than the Normal (NT) rate.

27. A temporally agreement was made with the workforce to work excessive OT during this contract.
28. Included in the working hours is a paid for 2 x 15 minutes "Tea Break". The team members will take this break on a "rotating/Staggered" basis, not to disrupt the operations.
29. The "Casting Team" will not take a Lunch Break, their lunch will be taken on a rotating/staggered basis.
30. The "Finishing Team will take an unpaid 1 (one) hour, Lunch Break

Total Marks (25)

Question 2 Owning and Operating cost.

You are the Plant Manager of a "Earthworks Company. You need to add equipment to your fleet, and the machines are:

i) A Grader ii) A Dozer

1. These machines will be used on a contract for earthworks operations.
2. The "Earthworks Company" envisages that these machines will be worked beyond the normal "Life Expectancy" of these machines.
3. This is because of the very thorough maintenance policy of the "Earthworks Company".
4. These operations will be 6 days per week (No Sunday work)
5. These operations continue throughout the year with no time breaks (Do not bring PPH in the calculation)
6. The Unscheduled Maintenance of the machine will be as follows:
    i)   Dozer 25 % of total Purchase price
    ii)   Grader 20 % of total Purchase price
7. General information on the machines is listed below in table format.
8. The payback period of the will be:
    i) 5 (five) years for the Dozer.
    ii) 4 (four) years for the Grader
9. The applicable interest rate will be 12 % pa. Use financial tables provided
10. The hours of the working of the machines have been estimated at:
    i)   8.5 hours per day. (Dozer)
    ii)   9.0 hours per day. (Grader)
11. The service and breakdown times need to be attended to during "daylight hours". (Client rules).
12. Insurance will be 5% of the Purchase price (including tyres) per year.
13. The anticipated economical lifetime of the machines is are in the Table below.
14. The residual value of the machines after the "Payback period will be:
    i) 25 % for the Dozer
    ii) 0 % for the Grader
15. The fuel price is R 14. 50 per liter
16. The operators:
    i)   Rate per hour (NT) R 45.00 per hour. Rate per hour (OT) R 60.00 per hour (Dozer)
    ii)   Rate per hour (NT) R 60.00 per hour. Rate per hour (OT) R 75.00 per hour. (Grader)
    iii)   Max. normal hours per week 45 hours (Basic Conditions of Employment Act)
    iv)   Maximum allowable overtime (OT) per week is 10 hours per week. (Basic Conditions of Employment Act)
    v)   The operators agreed to a 30 min. lunch with no pay for the lunch break.
    vi)   The lunch break will not be included in the "working hours". This is for the Operators.
    vii)   The Operator must receive annual leave (at full pay) at an allocation of 18 working days.
    viii)   During the leave period:
            a)   A standby operator must be hired in at a rate, 25% more than the normal operator.
            b)   The normal operator will not receive overtime (OT) during his holiday.

17. Ignore any VAT aspects for this calculation.
18. During machine stoppages (Service of breakdowns):
    - i)   The operator will receive normal remuneration.
    - ii)   The machines will not be replaced, but no income will be earned from the client for those periods. (NOTE: Leave this calculation to the very end)

Note: All prices in this Table R x 1000

No.	Machine (Operator Class)	Make	Model	Machine Price X 1000	Price Each	Freq in hour	No. off	Machine Life in hours
					Tyres			
1	Dozer (A)	Komatsu	D 85 EX	R 3 200	xxx	xxx	None	12 000
2	Grader (B)	Caterpillar	140 H	R 2 520	R 20	2500	6	14 000
3	Exca. (B)	Hitachi	EX 300	R 2 000	xxx	xxx	None	10 000
4	Roller (A)	Bomag	Drum	R 1 200	R 22	5000	2	16 000
5	ADT (A)	BELL	B 25	R 1 800	R 25	3000	6	15 000

No.	Machine	Residual Value %	Oil and lub. % of Life	Under carriage / Tracks Price	Freq. in hours	% of Life	GET Price / set	Freq. in hours	Fuel Consumption Liters / hour
1	Dozer	25	6	400	8000	6	15	1500	30
2	Grader	0	8	---	---	---	20	2000	24
3	Excavator	15	6	300	6000	5	7	1500	28
4	Roller	---	5	---	---	---	---	---	17
5	ADT	---	5	---	---	---	---	---	22

Please note.
You MUST use the pages provided for this Question.
On these pages ample areas are available to show the calculations.
Use the Rent tables for to determine the "Payback" for the purchase of the machine.
Work in Cost per hour.

It is required from the Student to Calculate the hourly cost for:
- i)   Owning the machines   (6)= 3 + 3
- ii)   Operating these Machines not including the operators.   (8)= 5 + 5
- iii)   The operators.   (6)= 3 + 3
- iv)   The total cost per hour for these machines   (4)= 2 + 2
         (2)

Total Marks [24]

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QUESTION 3 BOQ (Bill of quantities analysis)

A contractor has a contract with a value of R 71550 of which the Contract Budget is shown in Table below.

Against each of the of the items shown in the table is the value of the work as subdivided amongst the various cost headings i.e. Labour, Plant ect.

At the end of month 7 a progress survey shows the physical progress as a % completed for the different item as follows. A to G = 100%, H = 90%, I = 60%, J = 40%, K = 35% and L = 15%.

BOQ

Total Estimate Ernings (X)

CODE	ITEM	Lab. Cat. 1	Lab. Cat. 2	Lab. Cat. 3	Lab. Cat. 4	Lab. Cat. 5	Labour CAT.	LABOUR	PLANT	MATERIAL	SUB CONT.	Site O/H	H Office O/H	PROFIT	TOTAL	
A	Strip Soil						1	300	900	0	0	300	300	600	2400	100
B	Excavate						1	900	1500	0	0	600	600	750	4350	100
C	Construct Foundations						1	900	600	900	0	300	300	750	3750	100
D	Groundfloor Slabs						1	1500	900	900	0	450	450	600	4800	100
E	Colmns Ground floor						1	600	600	600	0	300	300	450	2850	100
F	Fisrst Slab						1	1800	1200	1200	0	450	450	600	5700	100
G	Colmns First Floor						1	750	900	600	0	450	450	450	3600	100
H	Roof Structure						2	600	450	1350	0	300	300	450	3450	100
I	Roof Cladding						3	450	450	750	0	300	300	450	2700	100
J	Glazing						4	300	900	1500	1500	600	600	600	6000	100
K	Services						1	300	0	0	15000	1500	1500	150	18450	100
L	Internal Finishes						5	4500	300	6000	0	1200	1200	300	13500	100
M	Subtotals (X)	0	0	0	0	0		12900	8700	13800	16500	6750	6750	6150	71550	100

Total Progress at end of month 7 (Y)

CODE	ITEM	Lab. Cat. 1	Lab. Cat. 2	Lab. Cat. 3	Lab. Cat. 4	Lab. Cat. 5	Labour CAT.	LABOUR	PLANT	MATERIAL	SUB CONT.	Site O/H	H Office O/H	PROFIT	TOTAL	
A	Strip Soil						1	300	900	0	0	300	300	600	2400	100
B	Excavate						1	900	1500	0	0	600	600	750	4350	100
C	Construct Foundations						1	900	600	900	0	300	300	750	3750	100
D	Groundfloor Slabs						1	1500	900	900	0	450	450	600	4800	100
E	Colmns Ground floor						1	600	600	600	0	300	300	450	2850	100
F	Fisrst Slab						1	1800	1200	1200	0	450	450	600	5700	100
G	Colmns First Floor						1	750	900	600	0	450	450	450	3600	100
H	Roof Structure						2									90
I	Roof Cladding						3									60
J	Glazing						4									40
K	Services						1									35
L	Internal Finishes						5									15
M	Subtotals (Y)															

Cost allocation at end month 7 (Z)

CODE	ITEM		Lab. Cat. 1	Lab. Cat. 2	Lab. Cat. 3	Lab. Cat. 4	Lab. Cat. 5	LABOR Tot	PLANT	MATERIAL	SUB CONT.	Site O/H	H Office O/H	PROFIT	TOTAL	
	Totals	(Z)	5000	420	250	150	800	6620	5000	4200	3300	2300			20870	

CMC 411 CONSTRUCTION MANAGEMENT IV

You are required to do the following:

The student must use the sheet supplied, to answer this question.

i)   Calculate the variances.   Marks (10)

ii)   Calculate the Percentage variance of the values completed.

        (On subtotals of Labour, Plant etc.)   Marks (10)

iii)   Calculate the Percentage completed   Marks (5)

                                          Total Marks [25]

QUESTION 4: Contract Price Adjustment

The site Engineer on the project had to leave urgently for overseas, and you have no communication with him. He took his laptop with him

You need to calculate the Contract Price Adjustment Factor for the Payment Certificate of this upcoming certificate: In this instance February 2012.

In this calculation use the "Indices" for the month of payment.

You have the following information available in the Table 4.1 below:

i)   Accumulative figures of progress at the end of each month.

ii)   Total project values for the different functions.

Table 4.1 Additional information available, below this Table:

Cumulative Date	LABOUR	PLANT	MATERIAL	FUEL	SUB CONT.	Site O/H	H Office O/H	PROFIT	TOTAL
31 May 2011	1200.00	4200.00	1600.00	1800.00	600.00	800.00	1000.00	1000.00	12200.00
30 June 2011	5500.00	8000.00	2700.00	2100.00	700.00	1700.00	2000.00	2000.00	24700.00
31 July 2011	6800.00	8600.00	6500.00	3500.00	1800.00	2500.00	3000.00	3000.00	35700.00
31 August 2011	8300.00	11000.00	11400.00	4600.00	2100.00	3300.00	4000.00	4000.00	48700.00
30 September 2011	11200.00	11600.00	16200.00	4800.00	2500.00	4200.00	5000.00	5000.00	60500.00
31 October 2011	17200.00	13400.00	20300.00	6300.00	3100.00	5000.00	6000.00	6000.00	77300.00
30 November 2011	19300.00	15200.00	24400.00	7800.00	3700.00	5800.00	7000.00	7000.00	90200.00
31 December 2011	25800.00	17000.00	28500.00	9300.00	4300.00	6700.00	8000.00	8000.00	107600.00
31 January 2012	31700.00	18800.00	32600.00	10800.00	4900.00	7500.00	9000.00	9000.00	124300.00
29 February 2012	38500.00	22700.00	35800.00	12000.00	6100.00	8300.00	10000.00	10000.00	143400.00
31 March 2012									
30 April 2012									
31 May 2012									
30 June 2012									
31 July 2012									
Total for Contract	57750.00	31200.00	46950.00	14700.00	9000.00	14000.00	16000.00	16000.00	205600.00

The Sub-Contractor only supplies plant, with no Operator and you supply the Sub-Contractor with diesel.

The base Indices (Lo, Mo, Po and Fo) for the calculation is the month preceding (just before) the award of this contract. This contract was awarded on 15 April 2011.

The portion of the contract not applicable to the price adjustment is 15%.

The values for the coefficient to represent the proportionate values of Labour (a), Plant (b), Material (c) and Fuel (d) can be determined, in this instance from the "Total for Contract" values , as shown in Table 4.1

Please note: Do **NOT** include the "Site O/H","H Office O/H" and "Profit" in your calculation to determine a, b, c and d.

The payment is for the month of February 2012.

A schedule of these indices is included for your convenience. (Courtesy of Stats. SA)

For the Labour indices use "City of Johannesburg. For the Fuel indices us "Fuel W Sale" at "Witwatersrand" area. For the Material indices use "Civil Engineering Material".

Please note: For this exercise the "TOTAL" value of the payment (Inclusive of O/H and Profit) is subjected to the Price Adjustment Factor

You are required to provide the following:

The student must use the sheet supplied, to answer this question.

i)	Calculate the values for a, b, c, d	(10)
ii)	Determine the value for all the: Lo. Mo, Po, and Fo and Lt, Mt, Pt and Ft	(4)
iii)	Determine the Factor to be applied, by deciding on the indices and calculate the Factor.	(5)
iv)	Determine the total value to be claimed from the Client, with the information available, at the end of February 2012.	(6)
		Total Marks (25)

QUESTION 5 – GENERAL
Quality

4.1 Name the international Quality Standard mostly used in S.A (2)

4.2 The General Scope of this standard has a few requirements name 6 of these (3)

4.3 Which are the 5 main aspects / divisions of this Standard (5)

4.4 Describe in your words what Document Control is about. (3)

4.5 Describe in your words what Record Control is about, an why is it important (2)

4.6 Why is Traceability important when you build a pipeline (2)

Health and Safety

4.7 Name the 2 most important Acts within the Health and Safety field

4.8 At the commencement of a construction site, a Contractor must be aware of the requirements referred to in the "CONSTRUCTION REGULATIONS" -

GNR 1010 of July 2003. Describe that according to this regulation:

    i)   What should a "Fall Protection Plan" consist of?   (2)

    ii)   What should a Contractor do when he performs excavation work?   (2)

4.10 Define the next four aspects 1) Safe, 2) Hazard, 3) Danger and 4) Risk   (2)

Total Marks [25]

Total Marks {100]

Tables for Payback No Residual

Price of item

8

	R1 000 000	R1 200 000	R1 400 000	R1 600 000	R1 800 000	R2 000 000	R2 200 000	R2 400 000	R2 600 000	R2 800 000	R3 000 000	R3 200 000	R3 400 000	R3 600 000
36	R31 336	R37 604	R43 871	R50 138	R56 405	R62 673	R68 940	R75 207	R81 475	R87 742	R94 009	R100 276	R106 544	R112 811
42	R27 377	R32 852	R38 328	R43 803	R49 279	R54 754	R60 229	R65 705	R71 180	R76 656	R82 131	R87 606	R93 082	R98 557
48	R24 413	R29 296	R34 178	R39 061	R43 943	R48 826	R53 708	R58 591	R63 474	R68 356	R73 239	R78 121	R83 004	R87 887
54	R22 112	R26 535	R30 957	R35 380	R39 802	R44 225	R48 647	R53 070	R57 492	R61 915	R66 337	R70 760	R75 182	R79 605
60	R20 276	R24 332	R28 387	R32 442	R36 498	R40 553	R44 608	R48 663	R52 719	R56 774	R60 829	R64 884	R68 940	R72 995

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	R1 000 000	R1 200 000	R1 400 000	R1 600 000	R1 800 000	R2 000 000	R2 200 000	R2 400 000	R2 600 000	R2 800 000	R3 000 000	R3 200 000	R3 400 000	R3 600 000
36	R32 267	R38 721	R45 174	R51 627	R58 081	R64 534	R70 988	R77 441	R83 895	R90 348	R96 802	R103 255	R109 708	R116 162
42	R28 317	R33 980	R39 644	R45 307	R50 970	R56 634	R62 297	R67 960	R73 624	R79 287	R84 950	R90 614	R96 277	R101 941
48	R25 363	R30 435	R35 508	R40 580	R45 653	R50 725	R55 798	R60 870	R65 943	R71 015	R76 088	R81 160	R86 233	R91 305
54	R23 072	R27 687	R32 301	R36 916	R41 530	R46 145	R50 759	R55 374	R59 988	R64 603	R69 217	R73 832	R78 446	R83 061
60	R21 247	R25 496	R29 746	R33 995	R38 245	R42 494	R46 743	R50 993	R55 242	R59 492	R63 741	R67 991	R72 240	R76 489

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	R1 000 000	R1 200 000	R1 400 000	R1 600 000	R1 800 000	R2 000 000	R2 200 000	R2 400 000	R2 600 000	R2 800 000	R3 000 000	R3 200 000	R3 400 000	R3 600 000
36	R33 214	R39 857	R46 500	R53 143	R59 786	R66 429	R73 071	R79 714	R86 357	R93 000	R99 643	R106 286	R112 929	R119 572
42	R29 276	R35 131	R40 986	R46 841	R52 696	R58 551	R64 406	R70 262	R76 117	R81 972	R87 827	R93 682	R99 537	R105 392
48	R26 334	R31 601	R36 867	R42 134	R47 401	R52 668	R57 934	R63 201	R68 468	R73 735	R79 002	R84 268	R89 535	R94 802
54	R24 057	R28 868	R33 679	R38 491	R43 302	R48 113	R52 924	R57 736	R62 547	R67 358	R72 170	R76 981	R81 792	R86 604
60	R22 244	R26 693	R31 142	R35 591	R40 040	R44 489	R48 938	R53 387	R57 836	R62 284	R66 733	R71 182	R75 631	R80 080

Tables for Payback

20% Residual — Interest 10%

Period	R 1 000 000	R 1 200 000	R 1 400 000	R 1 600 000	R 1 800 000	R 2 000 000	R 2 200 000	R 2 400 000	R 2 600 000	R 2 800 000	R 3 000 000	R 3 200 000	R 3 400 000	R 3 600 000
36	R 27 480	R 32 976	R 38 473	R 43 969	R 49 465	R 54 961	R 60 457	R 65 953	R 71 449	R 76 945	R 82 441	R 87 937	R 93 433	R 98 929
42	R 24 320	R 29 184	R 34 048	R 38 912	R 43 776	R 48 640	R 53 504	R 58 368	R 63 232	R 68 096	R 72 960	R 77 824	R 82 688	R 87 552
48	R 21 957	R 26 348	R 30 739	R 35 131	R 39 522	R 43 913	R 48 305	R 52 696	R 57 088	R 61 479	R 65 870	R 70 262	R 74 653	R 79 044
54	R 20 125	R 24 150	R 28 174	R 32 199	R 36 224	R 40 249	R 44 274	R 48 299	R 52 324	R 56 349	R 60 374	R 64 399	R 68 424	R 72 449
60	R 18 664	R 22 397	R 26 130	R 29 863	R 33 596	R 37 329	R 41 061	R 44 794	R 48 527	R 52 260	R 55 993	R 59 726	R 63 459	R 67 191

20% Residual — Interest 12%

Period	R 1 000 000	R 1 200 000	R 1 400 000	R 1 600 000	R 1 800 000	R 2 000 000	R 2 200 000	R 2 400 000	R 2 600 000	R 2 800 000	R 3 000 000	R 3 200 000	R 3 400 000	R 3 600 000
36	R 28 571	R 34 286	R 40 000	R 45 714	R 51 429	R 57 143	R 62 857	R 68 571	R 74 286	R 80 000	R 85 714	R 91 429	R 97 143	R 102 857
42	R 25 421	R 30 505	R 35 589	R 40 673	R 45 757	R 50 841	R 55 925	R 61 009	R 66 093	R 71 177	R 76 262	R 81 346	R 86 430	R 91 514
48	R 23 067	R 27 680	R 32 294	R 36 907	R 41 521	R 46 134	R 50 748	R 55 361	R 59 974	R 64 588	R 69 201	R 73 815	R 78 428	R 83 041
54	R 21 245	R 25 494	R 29 743	R 33 992	R 38 241	R 42 491	R 46 740	R 50 989	R 55 238	R 59 487	R 63 736	R 67 985	R 72 234	R 76 483
60	R 19 796	R 23 755	R 27 714	R 31 673	R 35 632	R 39 591	R 43 550	R 47 509	R 51 468	R 55 428	R 59 387	R 63 346	R 67 305	R 71 264

25% Residual — Interest 12%

Period	R 1 000 000	R 1 200 000	R 1 400 000	R 1 600 000	R 1 800 000	R 2 000 000	R 2 200 000	R 2 400 000	R 2 600 000	R 2 800 000	R 3 000 000	R 3 200 000	R 3 400 000	R 3 600 000
36	R 27 411	R 32 893	R 38 375	R 43 857	R 49 339	R 54 821	R 60 304	R 65 786	R 71 268	R 76 750	R 82 232	R 87 714	R 93 196	R 98 679
42	R 24 457	R 29 348	R 34 239	R 39 131	R 44 022	R 48 913	R 53 805	R 58 696	R 63 587	R 68 479	R 73 370	R 78 262	R 83 153	R 88 044
48	R 22 250	R 26 700	R 31 151	R 35 601	R 40 051	R 44 501	R 48 951	R 53 401	R 57 851	R 62 301	R 66 751	R 71 201	R 75 651	R 80 101
54	R 20 542	R 24 651	R 28 759	R 32 868	R 36 976	R 41 085	R 45 193	R 49 302	R 53 410	R 57 519	R 61 627	R 65 736	R 69 844	R 73 953
60	R 19 183	R 23 020	R 26 857	R 30 693	R 34 530	R 38 367	R 42 203	R 46 040	R 49 877	R 53 713	R 57 550	R 61 387	R 65 223	R 69 060

CONTRACT PRICE ADJUSTMENT SCHEDULE

1. The value of each monthly certificate shall be increased or decreased by the amount obtained by multiplying "Ac", defined in Clause 2 of this Schedule, by the Contract Price Adjustment Factor, rounded off to the fourth decimal place, determined according to the formula:

$$(1-x)\left[\frac{aLt}{Lo} + \frac{bPt}{Po} + \frac{cMt}{Mo} + \frac{dFt}{Fo} - 1\right]$$

in which the symbols have the following meaning:

"x" is the proportion of "Ac" which Is not subject to adjustment. Unless otherwise stated in the Contract Data, this proportion shall be 0,10.

"a", "b", "c" and "d" are the coefficients contained in the Contract Data, which are deemed, irrespective of the actual constituents of the work, to represent the proportionate value of labour, contractors' equipment, material (other than "special materials" specified in the Contract Data) and fuel respectively. The arithmetical sum of "a", "b", "c" and "d" shall be unity.

"L" is the "Labour Index" and shall be the Consumer Price Index (CPI per province) for the province wherein the larger part of the Site is located, as stated in the Contract Data, and as published in the Statistical News Release, P0141, Table A of Statistics South Africa.

"P" is the "Plant Index" and shall be the Producer Price Index for Civil Engineering Plant as published in the Statistical News Release P0142.1, Table 12 of Statistics South Africa.

"M" is the "Materials Index" and shall be the Producer Price Index applicable to the industry as stated in the Contract Data and as published in the Statistical News Release P0142.1, Table 11 of Statistics South Africa.

"F" is the "Fuel Index" and shall be the Producer Price Index for Diesel at wholesale level for the area as stated in the Contract Data and as published in the Statistical News Release P0142.1, Table 12 of Statistics South Africa.

The suffix "o" denotes the base indices applicable to the base month as stated in the Contract Data.

The suffix "t" denotes the current indices applicable to the month in which the last day of the period falls to which the relevant monthly statement relates.

If any index relevant to any particular certificate is not known at the time when the certificate is prepared, the Engineer shall estimate the value of such index. Any correction which may be necessary when the correct indices become known, shall be made by the Engineer in subsequent payment certificates.

2. For the purposes of calculating the adjustment to the value of the relevant monthly statement, the amount "Ac" shall be determined by the formula:

$$Ac = T - S - D - E - G - Ap$$

In which formula the symbols shall have the following meaning:

"T" is the summation of the total value of

(i)   General Items

(ii)   work done and the

(iii)   materials on Site

as certified in the monthly statement under consideration without any deduction whatsoever and before any adjustment made in terms of this Schedule.

"S" is the aggregate of (i), (ii), (iii) and (iv) referred to below and included in "T".

(i)   the amounts actually expended and substituted for any Prime Cost Sums;

(ii)   the value of any work done by Selected Subcontractors;

(iii)   the value of any work done against Provisional Sums;

(iv)   the value of any extra or additional work;

where special arrangements for price adjustments in respect of those amounts were made and recorded at the time the work was ordered.

"D" is the value of work included in "T" and done at new fixed rate, where those rates were not based on labour, contractors' equipment or materials costs in force at the time of tendering. Generally new rates may be based on current costs and de-escalated to the base month of the indices, in which case work done at these rates shall not be included in the value of "D".

"E" is the amount included in "T" and paid for any daywork executed at cost plus percentage allowances as set out in General Conditions of Contract Clause 6.5.1.2.

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"G" is the amount included in "T" for materials classified and dealt with as "special materials".

"Ap" is the summation of all "Ac" amounts determined in terms of Clause 2 of this Schedule for all monthly statements preceding in time the monthly statement under consideration.

3.   Save only for additional work or variations ordered to be carried out after the time for completion, the increase or decrease applied to monthly statement in terms of this Clause relating to work done or materials supplied after the time for completion shall be half the factor calculated by inserting the formula referred to in Clause 1 hereof the indices Lt, Pt, Mt and Ft applicable at the Due Completion Date.

4.1   The price of each "special material" specified in the Contact Data shall be increased or decreased by the net amount of any variation incurred after the date of tender on the basis set out in the Contract Data, provided that any claim for adjustment in terms hereof shall be substantiated by the submission of acceptable invoices and any other supporting documents that the Engineer considers necessary for the purpose, and provided also that no further adjustment be permitted to the price of any "special material" after the time for completion unless such material forms part of any additional work or variation ordered to be carried out after that date.

4.2   For the purposes of clause 4.1 hereof, "the net amount of any variations" in respect of a particular "special material" shall be calculated by multiplying the difference between the rate or price entered in the Contract Data by the Contractor for that material and the equivalent rate or price actually paid by the Contractor for the material by the quantity of the material in question.

5.   If more than one month intervenes between the month applicable to any monthly statement and the month applicable to the immediately succeeding monthly statement, then the indices "Lt", "Pt", "Mt" and "Ft" applicable to such succeeding monthly statement shall each be the arithmetic mean, rounded off to the second decimal place, of the relevant indices applicable to the month of measurement and to such intervening months.

Examination 2014 CMC411	Name		Date	
O / O Costs Machine:	Number			

			Totals	R/Hour
1 Working Hours	1.1 Per month			
	1.2 Per year			
	1.3 Per Day			
	1.4 Rer week			
2 Purchase	Residual Value %			
	First set of Tyres			
	Price			
	Monthly payback			
	Hourly			
3 Insurance	%			

Total Owning cost

4 Fuel

5 Planned Maintenance

6 Moving
6.1 Tyre Replace

6.2 Undercarridge

7 Repair Cost

8 GET

Total Operating Cost

9 Operator

Total Operator Cost

Total Cost

Examination	2014	CMC411	Name		Date	
O / O Costs Machine:			Number			

		Totals	R/Hour

1 Working Hours
- 1.1 Per month
- 1.2 Per year
- 1.3 Per Day
- 1.4 Rer week

2 Purchase
Residual Value %
First set of Tyres

Price
Monthly payback
Hourly

3 Insurance %

Total Owning cost

4 Fuel

5 Planned Maintenance

6 Moving
6.1 Tyre Replace

6.2 Undercarridge

7 Repair Cost

8 GET

Total Operating Cost

9 Operator

Total Operator Cost

Total Cost

Total Estimate Ernings (X)

CODE	ITEM		Lab. Ca 1	Lab. Ca 2	Lab. Ca 3	Lab. Ca 4	Lab. Ca 5	Labour CAT.	LABOU	PLANT	MATER	SUB CONT.	Site O/H	H Offic O/H	PROFIT	TOTAL	
A	Strip Soil							1	300	900	0	0	300	300	600	2400	100
B	Excavate							1	900	1500	0	0	600	600	750	4350	100
C	Construct Foundations							1	900	600	900	0	300	300	750	3750	100
D	Groundfloor Slabs							1	1500	900	900	0	450	450	600	4800	100
E	Colmns Ground floor							1	600	600	600	0	300	300	450	2850	100
F	Fisrst Slab							1	1800	1200	1200	0	450	450	600	5700	100
G	Colmns First Floor							1	750	900	600	0	450	450	450	3600	100
H	Roof Structure							2	600	450	1350	0	300	300	450	3450	100
I	Roof Cladding							3	450	450	750	0	300	300	450	2700	100
J	Glazing							4	300	900	1500	1500	600	600	600	6000	100
K	Services							1	300	0	0	15000	1500	1500	150	18450	100
L	Internal Finishes							5	4500	300	6000	0	1200	1200	300	13500	100
M	Subtotals	(X)	0	0	0	0	0		12900	8700	13800	16500	6750	6750	6150	71550	100

Total Progress at end of month 7 (Y)

CODE	ITEM		Lab. Ca 1	Lab. Ca 2	Lab. Ca 3	Lab. Ca 4	Lab. Ca 5	Labour CAT.	LABOU	PLANT	MATER	SUB CONT.	Site O/H	H Offic O/H	PROFIT	TOTAL	
A	Strip Soil							1	300	900	0	0	300	300	600	2400	100
B	Excavate							1	900	1500	0	0	600	600	750	4350	100
C	Construct Foundations							1	900	600	900	0	300	300	750	3750	100
D	Groundfloor Slabs							1	1500	900	900	0	450	450	600	4800	100
E	Colmns Ground floor							1	600	600	600	0	300	300	450	2850	100
F	Fisrst Slab							1	1800	1200	1200	0	450	450	600	5700	100
G	Colmns First Floor							1	750	900	600	0	450	450	600	3600	100
H	Roof Structure							2									90
I	Roof Cladding							3									60
J	Glazing							4									40
K	Services							1									35
L	Internal Finishes							5									15
M	Subtotals	(Y)															

Cost allocation at end month 7 (Z)

CODE	ITEM		Lab. Ca 1	Lab. Ca 2	Lab. Ca 3	Lab. Ca 4	Lab. Cat. 5	LABOR Tot	PLANT	MATER	SUB CONT.	Site O/H	H Offic O/H	PROFIT	TOTAL	

TABLE "A" - New Indices Dec 2012 = 100

Refer to P0141 - Consumer Price Index: Additiional Tables: Table 14 - CPI all items, according to area

Refer to P0151 - Contract Price Adjustment Provisions (CPAP)
Work Groups and Selected Materials Indices: Table 3 and Table 4

DEC 2012 = 100

		Western Cape	Eastern Cape		NC	F State	KwaZulu Natal		North West	Gauteng			Mpumalang	Limpopo	(Divide 2000 = 100 indices by conversion factors provided by								
															Table 3	Table 4	Table 4	Table 4	Table 4	Table 4	Table 4	Table 4	Table 4
Date		City of Cape Town	Port Elizabeth	East London	Kimberly	Bloem	Durban/ Pinetown	Pieter-Maritzburg	Rustenburg/ Klerksdorp	City of Tshwane	City of Johannesburg	Ekurhuleni	Witbank/ Nelspruit	Polokwane	Civil Engineering Material	[redacted]	[redacted]	Diesel Fuel	Civil Engineering Plant	[redacted]	[redacted]	WW Rand	Coast
Conversion F		[redacted]	#########	#########	##########	#########	#########	#########	[redacted]	#######	#######	#######	###########	0.7974481659	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1	2010	87.1	85.8	86.1	85.2	84.7	87.4	85.5	85.2	86.9	87.5	85.4	87.5	86.4	93.5	[redacted]	[redacted]	64.9	98.5	[redacted]	[redacted]	64.5	64.3
2	2010	87.4	86.5	86.7	85.4	85.3	87.7	85.9	86.2	87.5	88.0	85.9	88.1	87.1	93.8	[redacted]	[redacted]	66.6	98.5	[redacted]	[redacted]	65.4	65.2
3	2010	88.4	87.3	87.5	85.9	86.0	88.4	86.7	87.0	88.2	88.8	86.8	88.7	87.6	93.8	[redacted]	[redacted]	67.6	99.0	[redacted]	[redacted]	65.8	65.6
4	2010	88.7	87.4	87.8	86.3	86.4	88.5	86.6	87.2	88.4	89.0	86.9	88.8	87.6	93.7	[redacted]	[redacted]	71.5	99.0	[redacted]	[redacted]	70.4	70.3
5	2010	88.8	87.6	87.7	86.4	86.4	88.6	87.0	87.3	88.5	89.1	87.0	89.0	88.0	94.8	[redacted]	[redacted]	73.4	98.3	[redacted]	[redacted]	73.1	72.9
6	2010	88.7	87.8	87.8	86.1	86.5	88.6	87.1	87.4	88.7	89.2	86.8	89.1	88.0	95.4	[redacted]	[redacted]	72.4	98.2	[redacted]	[redacted]	71.7	71.6
7	2010	89.1	88.4	88.3	87.4	87.3	88.8	87.9	87.9	89.3	89.6	87.8	89.1	88.4	94.2	[redacted]	[redacted]	71.3	98.1	[redacted]	[redacted]	70.3	70.2
8	2010	89.1	88.4	88.3	87.4	87.4	88.8	88.1	87.9	89.2	89.8	87.7	89.8	88.5	93.6	[redacted]	[redacted]	70.6	97.8	[redacted]	[redacted]	69.0	68.9
9	2010	89.2	88.6	88.3	87.6	87.9	88.6	88.5	88.1	89.5	89.8	87.6	89.9	88.8	93.6	[redacted]	[redacted]	70.0	97.8	[redacted]	[redacted]	69.0	68.9
10	2010	89.3	88.7	88.5	87.8	88.1	88.8	88.5	88.2	89.6	90.0	87.9	90.4	89.2	94.1	[redacted]	[redacted]	70.2	97.9	[redacted]	[redacted]	68.8	68.7
11	2010	89.4	88.9	88.5	87.8	88.1	88.9	88.6	88.3	89.8	90.1	88.0	90.2	89.4	93.7	[redacted]	[redacted]	72.1	98.2	[redacted]	[redacted]	71.1	71.0
12	2010	89.6	89.0	88.7	87.8	88.3	89.0	88.8	88.3	89.9	90.3	88.4	90.2	89.4	93.8	[redacted]	[redacted]	74.6	97.3	[redacted]	[redacted]	71.1	71.0
1	2011	90.0	89.5	89.0	88.5	88.9	89.4	89.3	88.9	90.0	90.6	88.9	90.8	90.1	94.8	[redacted]	[redacted]	77.4	96.5	[redacted]	[redacted]	73.3	73.2
2	2011	90.7	90.2	89.7	89.1	89.5	90.0	89.9	90.0	90.5	91.2	89.4	91.4	90.7	95.0	[redacted]	[redacted]	84.6	97.7	[redacted]	[redacted]	76.2	76.1
3	2011	91.8	91.3	90.6	90.2	90.7	90.9	90.7	91.0	91.6	92.1	90.7	92.0	92.0	95.7	[redacted]	[redacted]	90.2	98.1	[redacted]	[redacted]	82.1	82.2
4	2011	92.1	91.5	90.9	90.5	91.1	91.3	91.2	91.3	92.0	92.3	91.1	92.2	92.2	95.1	[redacted]	[redacted]	95.6	98.2	[redacted]	[redacted]	88.7	88.3
5	2011	92.6	91.9	91.3	90.8	91.4	91.8	91.5	91.7	92.4	92.8	91.5	92.7	92.7	94.9	[redacted]	[redacted]	94.6	98.2	[redacted]	[redacted]	90.2	89.8
6	2011	92.9	92.1	91.9	91.0	91.7	92.3	92.1	92.0	92.7	93.2	92.2	92.8	93.0	95.1	[redacted]	[redacted]	91.8	98.9	[redacted]	[redacted]	86.6	86.2
7	2011	93.5	93.1	92.6	92.9	93.0	93.0	92.9	92.8	93.4	94.0	93.0	93.7	93.4	96.4	[redacted]	[redacted]	91.2	99.1	[redacted]	[redacted]	85.6	85.1
8	2011	93.7	93.2	92.8	93.3	93.3	93.3	93.0	93.0	93.6	94.1	93.2	93.8	93.8	96.7	[redacted]	[redacted]	91.0	99.2	[redacted]	[redacted]	87.0	86.5
9	2011	94.1	93.6	93.1	93.6	93.7	93.5	93.2	93.3	93.9	94.1	93.5	94.3	94.1	96.9	[redacted]	[redacted]	91.0	99.1	[redacted]	[redacted]	87.0	86.5
10	2011	94.5	94.1	93.7	94.3	94.3	94.2	93.8	93.7	94.4	94.7	94.1	94.8	94.7	97.5	[redacted]	[redacted]	94.6	98.3	[redacted]	[redacted]	90.3	89.9
11	2011	94.6	94.4	93.9	94.7	94.5	94.6	94.2	94.0	94.7	94.8	94.4	94.9	94.8	98.2	[redacted]	[redacted]	99.6	98.3	[redacted]	[redacted]	93.7	93.3
12	2011	94.8	94.6	94.1	94.9	94.9	94.8	94.3	94.2	94.9	94.9	94.5	95.2	95.1	98.4	[redacted]	[redacted]	101.2	98.7	[redacted]	[redacted]	96.6	97.8
1	2012	95.2	95.0	94.2	95.6	95.4	95.0	94.9	94.6	95.6	95.5	95.1	95.9	95.5	98.8	[redacted]	[redacted]	98.7	98.8	[redacted]	[redacted]	96.1	95.8
2	2012	95.6	95.4	95.0	96.1	96.1	95.5	95.5	95.6	96.1	96.1	95.7	96.5	96.1	99.7	[redacted]	[redacted]	98.6	99.2	[redacted]	[redacted]	96.1	95.7
3	2012	96.7	96.5	96.7	96.9	97.1	96.6	96.3	97.0	97.2	97.0	96.5	97.2	97.0	100.4	[redacted]	[redacted]	99.8	98.6	[redacted]	[redacted]	97.0	96.7
4	2012	97.1	96.9	97.2	97.1	97.5	97.1	96.6	97.3	97.6	97.4	96.9	97.7	97.4	100.3	[redacted]	[redacted]	101.8	98.8	[redacted]	[redacted]	101.8	101.2
5	2012	97.3	97.1	97.4	97.1	97.4	97.2	96.9	97.4	97.7	97.4	97.0	97.6	97.4	99.9	[redacted]	[redacted]	102.8	99.7	[redacted]	[redacted]	102.7	102.1
6	2012	97.5	97.5	97.6	97.1	97.4	97.4	97.6	97.4	97.6	97.9	97.4	97.8	97.2	99.8	[redacted]	[redacted]	98.9	99.9	[redacted]	[redacted]	100.4	100.1
7	2012	97.9	98.0	97.9	98.1	97.7	97.6	97.9	97.7	98.0	98.2	97.7	98.3	97.7	100.0	[redacted]	[redacted]	91.3	100.1	[redacted]	[redacted]	94.6	93.8
8	2012	98.0	98.2	98.0	98.3	98.0	97.8	98.0	98.0	98.2	98.4	98.0	98.3	97.9	100.3	[redacted]	[redacted]	93.5	100.3	[redacted]	[redacted]	95.9	95.1
9	2012	98.9	98.8	98.8	99.2	98.8	98.7	98.9	99.1	99.0	99.1	98.8	99.2	99.0	100.1	[redacted]	[redacted]	99.5	100.8	[redacted]	[redacted]	102.4	101.7
10	2012	99.4	99.4	99.4	99.7	99.5	99.4	99.5	99.7	99.6	99.7	99.6	99.6	99.6	99.8	[redacted]	[redacted]	104.4	100.8	[redacted]	[redacted]	102.9	105.5
11	2012	99.6	99.8	99.6	100.0	99.8	99.6	99.7	99.8	99.8	99.9	99.8	99.8	99.8	100.1	[redacted]	[redacted]	105.9	101.2	[redacted]	[redacted]	105.3	106.4
12	2012	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.4	[redacted]	[redacted]	105.1	101.5	[redacted]	[redacted]	104.8	105.9
1	2013	100.2	100.1	100.3	100.5	100.4	100.1	100.5	100.2	100.3	100.4	100.4	100.4	100.5	101.8	[redacted]	[redacted]	103.0	102.3	[redacted]	[redacted]	102.2	103.4
2	2013	100.8	101.2	101.3	100.9	101.2	101.2	102.0	101.2	101.7	101.8	101.5	101.4	101.3	102.2	[redacted]	[redacted]	104.3	102.5	[redacted]	[redacted]	103.9	105.0
3	2013	102.2	102.0	102.4	101.8	102.4	102.8	102.9	102.4	103.2	103.0	102.6	102.1	102.8	103.1	[redacted]	[redacted]	108.6	103.6	[redacted]	[redacted]	109.3	110.6
4	2013	102.5	102.2	102.8	102.1	102.7	102.9	103.0	102.6	103.6	103.3	102.9	102.3	103.0	103.9	[redacted]	[redacted]	104.7	103.7	[redacted]	[redacted]	104.3	105.3
5	2013	102.2	102.1	102.5	101.8	102.6	102.5	102.5	102.5	103.3	102.9	102.5	102.1	103.0	104.2	[redacted]	[redacted]	101.5	104.5	[redacted]	[redacted]	103.9	104.9
6	2013	102.5	102.5	102.9	101.9	103.3	102.9	102.7	102.7	103.8	103.4	102.9	102.3	103.4	104.9	[redacted]	[redacted]	103.2	105.4	[redacted]	[redacted]	111.0	112.4
7	2013	103.4	103.4	104.9	103.3	104.3	104.2	104.0	103.8	105.0	104.3	104.0	103.2	104.3	105.40	[redacted]	[redacted]	106.40	107.10	[redacted]	[redacted]	114.10	115.50
8	2013	103.7	103.7	105.0	103.7	104.6	104.6	104.4	104.1	105.2	104.6	104.3	103.4	104.7	105.60	[redacted]	[redacted]	109.80	108.10	[redacted]	[redacted]	115.30	116.70
9	2013	104.6	104.1	105.6	104.3	105.3	105.0	105.1	104.6	105.7	104.8	104.9	104.0	105.3	105.10	[redacted]	[redacted]	111.50	108.60	[redacted]	[redacted]	115.20	116.60