

PROGRAM	:	BACHELOR IN CONSTRUCTION	
<u>SUBJECT</u>	:	CONSTRUCTION MANAGEMENT II	
<u>CODE</u>	:	CMGCOY2	
<u>DATE</u>	:	SUMMER FINAL EXAMINATION 2019 NOVEMBER	
<b>DURATION</b>	:	(SESSION )	
<u>WEIGHT</u>	:	40: 60	
TOTAL MARKS	:	100	
ASSESSOR	:	Z MATSANE	
<b>MODERATOR</b>	:	L NGWENYA FILE NO	
NUMBER OF PAGES	:	14 PAGES	
<b>INSTRUCTIONS</b>	:	ONLY ONE POCKET CALCULATOR PER CANDIDATE MAY BE USED.	
<u>REQUIREMENTS</u>	:	ANSWER SCRIPT	

# **INSTRUCTIONS TO STUDENTS**

- PLEASE ANSWER ALL QUESTIONS
- PAY ATTENTION TO QUESTION 3.4 INSTRUCTIONS. THE BOQ TO AID IN ANSWERING THE QUESTION IS ATTACHED TO THIS QUESTION
- QUESTION 4.2 MUST BE ANSWERED ON PAGE 13 OF THIS QUESTION PAPER AND SUBMITTED ALONG WITH YOUR ANSWER SCRIPT
- QUESTION 4.2 SHOULD BE COMPLETED ON THE ANSWER SCRIPT PROVIDED BY THE INVIGILATOR

#### **QUESTION 1**

1.1.	Discuss the following five (5) key te	erms of management and how they
	relate to construction:	

- 1.1.1. Supervision
- 1.1.2. Coordinating
- 1.1.3. Communication
- 1.1.4. Forecast
- 1.1.5. Resources
- 1.2. Which management pioneer's work did Douglas McGregor base his theory x and y respectively? (2)1.3. Write a one (1) page essay, entitled "The Apostle of Mass Production"
- in which you discuss Henry Ford's personal and professional contribution to modern management theory?
- 1.4. Discuss the phenomenon that is the "Hawthorne Effect" (3)

[<u>20]</u>

 $(10 \text{ x} \frac{1}{2})$ 

(20 x <sup>1</sup>/<sub>2</sub>)

#### **QUESTION 2**

2.1. Justify why scholars have opted for a scientific approach to	
management theory and why this is sufficient	(4)
2.2. Why is system thinking a required skill for a competent construction	
manager?	(2)
2.3. How can mathematical complexity be measured?	(2)
2.4. According to Radosavljevic and Bennett (2012), Construction	
management is at the centre of both company and project management.	
How is this statement true?	(1)
2.5. Provide an annotated sketch of the systems view of managing	
construction	(8)

[<u>17</u>]

#### **QUESTION 3**

- 3.1. Construction teams can be described as formal group of individuals who work together on a permanent bases to undertake specialist construction, and the essential machines and equipment the team uses. Who constitutes a competent construction team?
- 3.2. Study the figure below and state who is mostly likely to represent the three construction teams outside the limit of established relationships



Igure 7: Relationships between construction team (Adopted from Radosavljevic and Bennett, 2012).

- 3.3. According to Radosavljevic and Bennett (2012), what can reduce inherent difficulties, make the project more straightforward and ensure that construction teams interact and establish effective working relationships
- 3.4. Study the Bill of Quantities provided (attached to the question paper 6) and prepare a comprehensive Work Breakdown Structure for the project's services and finishes. Demonstrate the progressive elaboration technique (WBS) of Services and Finishes only. Divide the project into systems, subsystems and components

(12 x <sup>1</sup>/<sub>2</sub>)

 $(6 \times \frac{1}{2})$ 

(5)

[<u>24</u>]

(20 x <sup>1</sup>/<sub>2</sub>)

# **QUESTION 4**

- 4.1. Name the three (3) the critical aspects of method statement preparation
- 4.2. Study the Doornfontein Energy Center BOQ below and provide a method statement for the trade using the answer sheet on page 13 of this question paper

EXCAVATION, FILLING, ETC OTHER THAN BULK		
Excavation in earth not exceeding 2m deep		
Holes	m3	з
Strip footings	m3	13
<u>Extra over trench and hole excavations in earth for</u> excavation in		
Soft rock	m3	2
Hard rock	m3	1
Extra over excavations for carting away		
Surplus material from excavations and/or stock piles on site to a dumping site to be located by the contractor	m3	8
Risk of collapse of excavations		
Sides of trench and hole excavations not exceeding 1,5m deep	m2	48

(3)

(20 x ½)

ACTIVITY	PREDECESSOR	<b>DURATION</b> (Days)
А	-	2
В	А	3
С	-	5
D	B;F	3
E	A;C	7
F	E	2
G	F	4
Н	G;K	8
Ι	G	7
J	Н	2
K	D	6
L	I;J	5
М	-	1
Ν	М	3
0	K;N	4
Р	J;L	3
Q	O;P	7
R	O;Q	9

4.3. Consider the details of a project as shown in the table:

4.3.1. Construct the CPM network diagram (36 x <sup>1</sup>/<sub>2</sub>)
4.3.2. Calculate the total floats of each activity and determine the critical path (present the critical path) (8)

[<u>39</u>]

 $\mathbf{TOTAL} = \mathbf{100}$ 

MATERIAL FOR QUESTION 3.4.

# BILL OF QUANTITIES OF FOUR BEDROOM HOUSE IN DOORNFONTEIN

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#### 1. Masonry

Brickwork of NFP bricks in class II mortar

Half brick walls

One brick walls

Brick reinforcement

75mm Wide reinforcement built in horizontally

150mm Wide reinforcement built in horizontally

Prestressed fabricated lintels

110 x 75mm Lintels in lengths not exceeding 3m

# 2. Waterproofing

Silicon sealing compound including non-fungul sustaining clear silicon sealant

Between wall and edge of work top

# 3. Carpentry and Joinery

Doors

Solid laminated interior flush panel doors with hardboard face suitable for paint both sides and two wrought Meranti concealed vertical edge strips

40mm Door 813 x 2032mm high

Extra over door for cutting 500 x 500mm high opening for aluminium louvre door grille (elsewhere)

Skirtings

Wrought meranti

19 x 76mm Skirting nailed to walls with heads of nails punched and filled including 19mm quadrant bead planted on at junction with floor

15 x 100mm Skirting nailed to walls with heads of nails punched and filled including 19mm quadrant bead planted on at junction

#### Joinery sundries

Vanity tops in 20mm thick polished 'Montrelli pearl white 207 vanity top cut out for drop-in basins including mild steel brackets supports painted with two coats white enamel paint finish Montrelli pearl white counter top 1700mm long x 800mm wide with two hole for wash hand basin fixed to wall with and including medesty panel, splashback, support brackets, bolts, etc

Montrelli pearl white counter top 850mm long x 800mm wide with one single hole for wash hand basin fixed to wall with and including, medesty panel, splashback, support brackets, bolts, Etc

#### 4. Ceilings

Suspended ceilings

# Gypsum plasterboard ceilings

Pelican systems flush plastered ceiling system suspended not exceeding 1m below concrete soffit with 12mm thick tapered edge plasterboard fixed at angles to 35mm galvanised steel main and cross tees at 600mm centres, using 25mm drywall screws at 150mm centres. All joints to be taped and plastered with gypsum skim plaster and prepared for decoration, all in accordance with the manufacturer's instructions

#### Bulkheads (dining area)

300mm wide horizontal portion of bulkhead, suspended not exceeding 1m below ceiling

#### Partitions etc

# Fixed partitions

"Donn Ultrasteel system" steel stud partitions with one layer of 15mm firestop board rhino board on both sides of framing. All joints to be taped and flushed with single coat 'Rhinolite plaster (Kitchen/Dining Area and Walk-in Closet)

# Doors

Extra over partition for 1269 x 2032mm one and half leaf timber door hung to and including standard natural anodised aluminium door frame with hinges, grommets including additional studding, trimming, etc lockset (elsewhere)

# 5. Floor Coverings

# Fixing

Floor coverings, wall linings, etc shall, where applicable, be fixed with adhesive as recommended by the manufacturers of the flooring, linings, etc

# Floor coverings

500 x 500mm "Miliken or similar approved" carpet tiles, fixed to screed with an approved adhesive. Colour: XN 07

# On floors

#### Additional floor for atic stock

300 x 300 x 2mm Thick "Floorwox or similar approved" fully flexible vinyl tiles fixed to screed with an approved adhesive all as per Architect Specification FL03. Colour: MS023

#### On floors

Polish, sealers, etc

Sweep, clean with detergent complying with SABS 825, rinse and apply three coats of water emulsion polish complying with SABS 1042, including buffing after application of one coat of each coat of polish

On vinyl flooring

On floor

### 6. Ironmongery

Handles

"Union" or other similar approved" 'Code AL6D00L-73AS' Aluminium lever handle

Stainless steel 400 x 32 diameter pull handle (code 5205BBSS), fixed back to back

#### Sundries

"Union" or other similar approved"

'Code CZ8731SC' Cast zinc door stop with satin chrome finish plugged and screwed to wall

# 7. Metal Work

Door frames, doors, windows, etc

Pressed steel door frames

1,2mm Double rebated frames suitable for one brick walls, fitted with one pair brass hinges per door leaf

Frame for door size 813 x 2032mm high suitable for half brick wall

Frame for double door size 1600 x 2064mm high suitable for half brick wall

#### Frameless shopfronts and lobby screens

Purpose made frameless glass door size 909 x 2057mm high made of 12mm PVB laminated toughened safety glass including all necessary Dorma universal patch fittings

8. Plastering Specialist floor coverings Prepare surfaces in strict accordance with specifications and apply self-levelling cementitious compound consisting of single component self-levelling cement-based screed applied strictly in accordance with the manufacuturer's specifications

25mm Thick on floors

#### Internal plaster

One coat cement plaster to brickwork with steel trowel to receive an approved high quality paint

On walls

On narrow widths

One coat rhinolite finish

On partitions

On walls

Dividing strips, nosing strips, trims etc

"Kirk M-Trim" Aluminium straight edge trim dividing strip as code ASE050 cast into screed on floors "Kirk M-Trim" 8 x 10mm Aluminium square edge trim as code ASQE100 fixed to cement plastered wall

# 9. Plumbing

Sanitary fittings

Stainless steel grade 304 (18/10)

"Franke code 820004" stainless steel single bowl sink, size 975 x 500 wide, fitted on a cupboard (elsewhere) sealed around with clear silicon sealant, including 38mm waste fittings and PVC traps (elsewhere)

'Franke Rondo 'RDX 610-44' 450mm diameter x 145mm deep prep bowl with and including 38mm waste fitting and spazio 1(Code: 301152) fitted on cupboard (elsewhere)

Vaal vitreous china 412 x 500mm round emerald basin with one tap hole and integrated overflow, bolted to the wall using two 10mm bolts (code 844820) and a tiara concealed wall bracket (code 8111Z0)

Waste unions etc

"Cobra Watertech" or other equal and approved

40mm Chromium plated basin waste union and with anti-theft plug with spindle (code: 309-40) *Traps etc*40mm Butyl rubber sink combination for single bowl with deepseal "P" trap

# Sanitary plumbing <u>uPVC pipes</u>

40mm Pipe laid in/under floors or fixed to walls, roof timbers, etc

50mm Pipe laid in/under floors or fixed to walls, roof timbers, etc

#### WATER SUPPLIES

Class 0 copper piping completely installed and including running joints

15mm Pipes chased into brick walls

22mm Pipes chased into brick walls

#### Electric water heaters

10 Litre under basin electric water heater size 360 x 360 x 254mm with suitable two water outlets and all necessary fittings (pressure reducing valve, vacuum breaker, etc) and copper pipes

#### **10. Glazing**

Tops, shelves, doors, mirrors, etc

3mm Silvered float glass copper backed mirrors with bevelled edges and fixed to timber backing on brickwork or concrete

Mirror size 600 x 1074mm high including timber backing fixed to wall

# 11. Paintwork

#### On floated plaster

Prepare and apply one coat plaster primer, two coats Plascon Wall and All. (Colour: Y4-E2-3 Evasive White)

On walls

On plaster board

Prepare and apply one coat plaster primer, two coats Plascon Wall and All. Colour: White

On ceiling

### On bulkheads

Prepare and apply one coat Plascon bonding liquid, one coat plaster primer, two coats Plascon Wall and All. Colour: Plascon Y4-E2-3 Evasive White

#### On doors

Prepare and apply one coat primer, one coat universal undercoat and two coats Plascon Velvaglo (Colour: Plascon E29-6 Bovine)

On skirtings, rails, etc not exceeding 300 mm girth

On metal

Prepare and apply one coat universal undercoat, two coats Plascon Velvaglo (Colour: Y4-E2-1 Samovar) On pressed steel door frames, etc

Prepare and apply one coat red oxide factory prime coat, one coat universal undercoat, two coats Plascon Velvaglo (Colour: Y4-E2-1 Samovar)

### QUESTION 4.2 ANSWER SHEET (REMOVE AND SUBMIT WITH EXAM ANSWER SCRIPT)

# METHOD AND RESOURCE STATEMENT

CONTRACT:	
PREPARED BY:	
DATE:	

**Operation Name:** 

**Quantity:** 

**Operation description:** 

Method:	

Graphical illustration of trade: