



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2014

MECHANICAL TECHNOLOGY

MARKS: 200

TIME: 3 hours



This question paper consists of 23 pages including a formula sheet.

INSTRUCTIONS AND INFORMATION

1. Write your name and surname in the spaces provided in the ANSWER BOOK.
2. Answer ALL the questions thoroughly.
3. Read ALL the questions thoroughly.
4. Number the questions carefully according to the numbering system used in this question paper.
5. Write neatly and legibly.
6. Show ALL calculations and units.
7. Round off final answers to TWO decimal places.
8. Candidates are allowed to use non-programmable scientific calculators and drawing/mathematical instruments.
9. The value of gravitational acceleration should be taken as 10 m/s^2 .
10. Use the criteria below in managing your time:

QUESTION	TOPIC	MARKS
1	Multiple-choice questions	20
2	Safety	10
3	Tools and equipment	12
4	Materials	13
5	Terminology	30
6	Joining methods	25
7	Forces	30
8	Maintenance	15
9	Systems and control	25
10	Pumps	20
	TOTAL	200

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

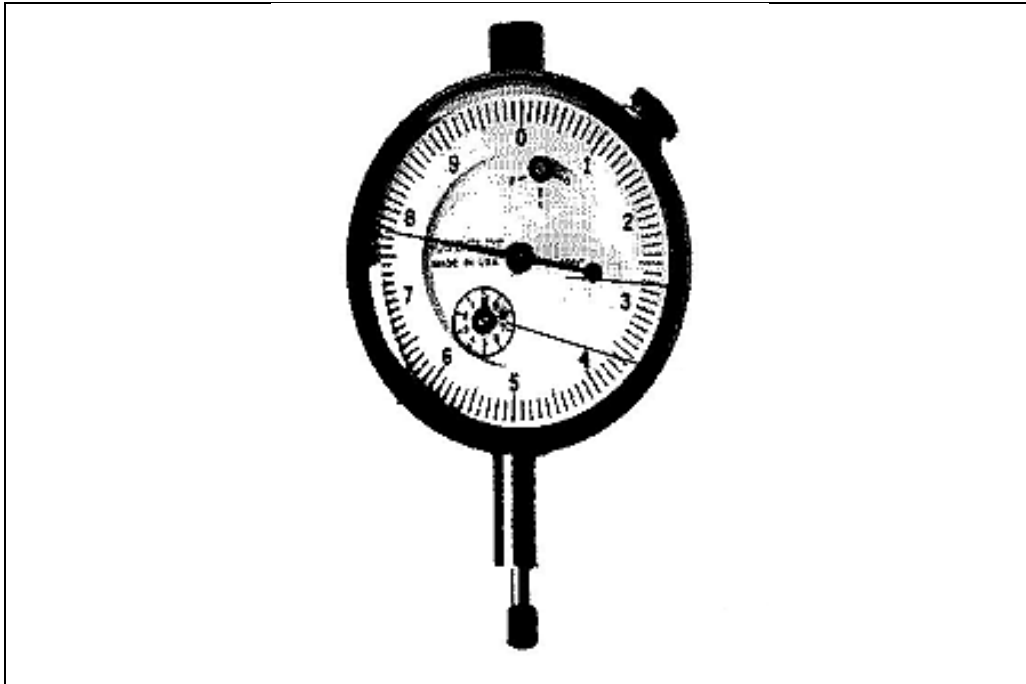
1.1 Which of the following is NOT a cause of accidents?

- A Poor housekeeping
 - B Improper use of tools
 - C Loose clothing
 - D Install machines
- (1)

1.2 Given are the following safety measures before a welding and flame cutting operation. Which measure does NOT apply?

- A An operator must be trained on how to use the apparatus safely.
 - B The insulation of electrical leads must be in sound condition.
 - C No partitioning is needed in the workshop.
 - D The welder must be completely insulated by protective gear.
- (1)

1.3 Which statement does NOT apply when using a dial indicator?



- A To determine if a crankshaft is bent.
 - B To determine if a crankshaft has four journals.
 - C To determine if a work piece on a lathe is running true.
 - D To determine the end float on a crankshaft.
- (1)

- 1.4 Which one of the following activities is NOT applicable when using torque wrenches?



- A Tightening cylinder head bolts or nuts.
B Tightening wheel bearing nuts.
C Assembling rear axles.
D Adjusting alternator bracket. (1)
- 1.5 The definition of plasticity refers to the ...
- A ability of the material to absorb forces and flex in different directions and return to its original size.
B material's ability to change shape by stretching it along its length or to be drawn into wire.
C material's ability to change shape permanently.
D ability of the material to withstand shock loads and remain intact after repeated bending in different directions. (1)
- 1.6 Complete the statement: Preliminary annealing of cast steel ...
- A relieves most stresses.
B hardens the metal.
C makes drilling and grinding impossible.
D reduces the critical temperature. (1)
- 1.7 The metric system of units has been standardised and modernised. What does the abbreviation SI stand for?
- A International system of unity
B International system of unions
C International system of units
D International system of united States (1)

- 1.8 Calculate the indexing for a gear with 98 teeth. Choose the correct answer.
- A 2 turns and 2 holes in a 49-hole circle
 - B 2 turn and 9 holes in a 49-hole circle
 - C 1 turn and 13 holes in a 49-hole circle
 - D 2 turns and 1 hole in a 49-hole circle
- (1)

- 1.9 Which ONE of the following indexing methods can be used to machine a gear with 98 teeth?
- A Simple indexing
 - B Angular indexing
 - C Differential indexing
 - D None of the above
- (1)

1.10 Identify the welding symbol position as shown in FIGURE 1.9 below.

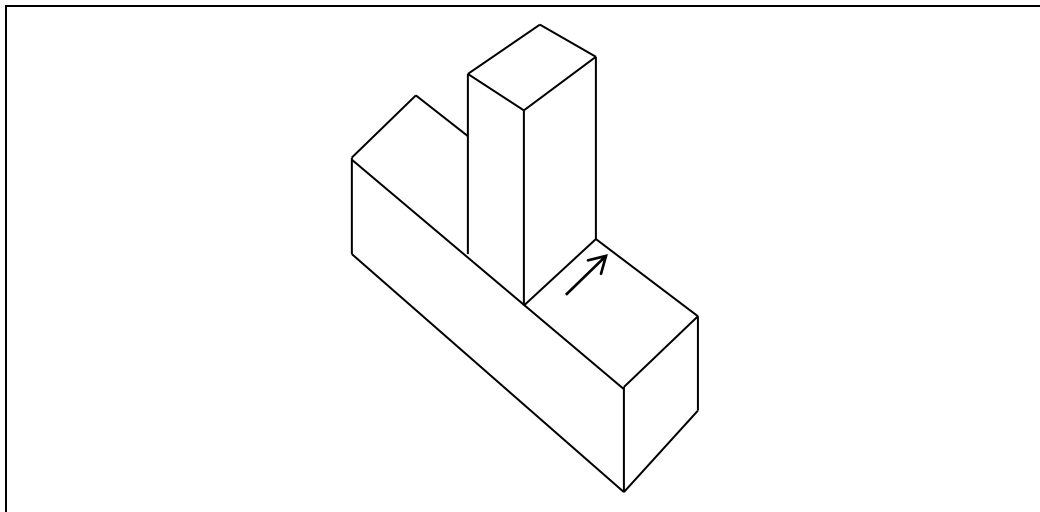


FIGURE 1.9

- A Flat position
 - B Vertical position
 - C Horizontal position
 - D Oblique position
- (1)

1.11 Identify the welding operation in the illustration below in FIGURE 1.11.

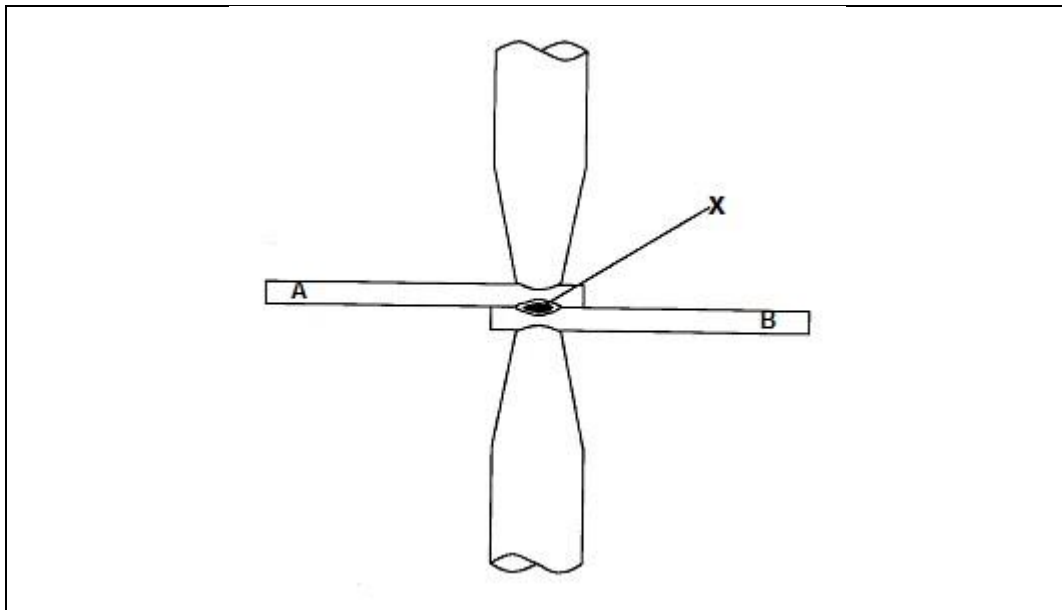


FIGURE 1.11

- A Tack welding
- B Scratch welding
- C Spot welding
- D Tap welding

(1)

1.12 Calculate the bending moment at point A (BM A) in FIGURE 1.12 below. Choose the correct answer.

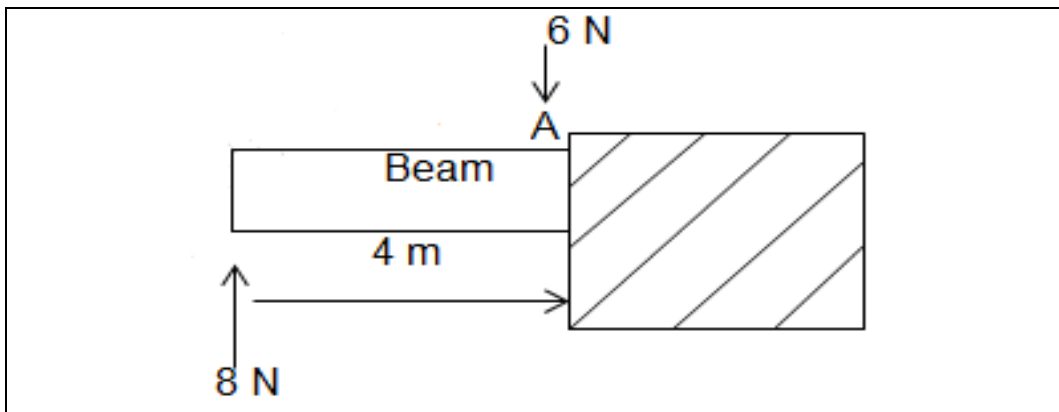


FIGURE 1.12

- A 6 N
- B 12 N
- C 32 N
- D 48 N

(1)

1.13 Calculate force X as shown in FIGURE 1.13 below. Choose the correct answer.

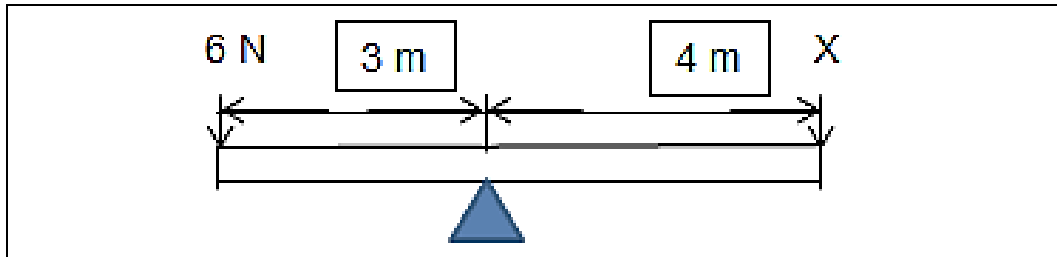


FIGURE 1.13

- A 4 N/m
 - B 4,5 N/m
 - C 14,5 N/m
 - D 4,15 N/m
- (1)

1.14 Complete the following sentence.
The percentage of time prescribed by a manufacturer for the use of a particular machine is called ...

- A retarding.
 - B alignment
 - C duty cycle.
 - D life span
- (1)

1.15 The illustration below shows a technician clamping the wheels of the motor vehicle, checking ... Choose the correct answer.



- A wheel balancing.
 - B dynamic balancing
 - C wheel alignment.
 - D static alignment.
- (1)

1.16 Identify the precision tool in FIGURE 1.16 below.



FIGURE 1.16

- A Inside micrometer
- B Outside micrometer
- C Screw thread micrometer
- D Depth micrometer

(1)

1.17 Pneumatic valves can be classified in three general categories. Which ONE of the following is NOT regarded as a pneumatic valve category?

- A Check valves
- B Drain-cock valves
- C Pressure-reducing valves
- D Foot valve

(1)

1.18 Identify the pump in the illustration FIGURE 1.17 below.

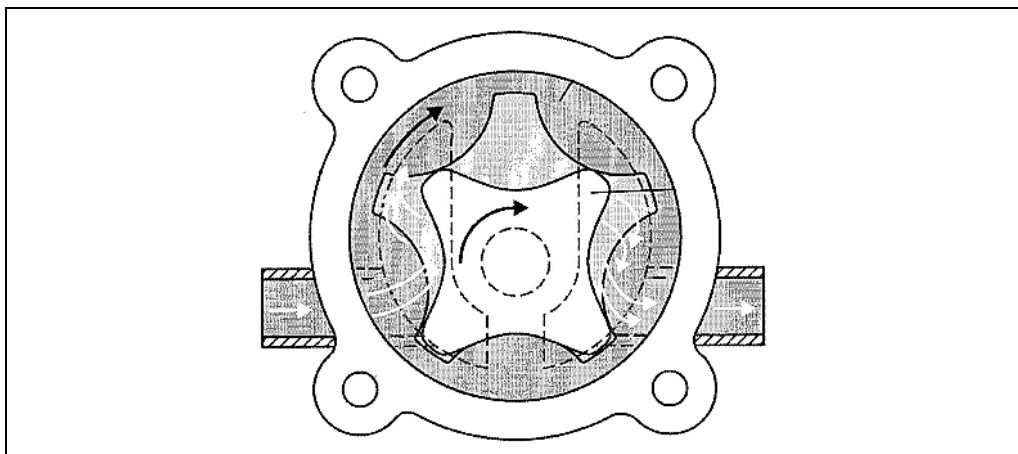


FIGURE 1.17

- A Gear pump
- B Vane pump
- C Rotor pump
- D Reciprocating pump

(1)

1.19 Suppose a piston acts on a liquid with a force of 6 250 N and the area of the piston is 2,5 m². Find the pressure in the liquid. Select the correct answer.

- A 1 500 Pa
- B 1 250 Pa
- C 2 500 Pa
- D 5 200 Pa

(1)

1.20 Which of the following pumps is NOT suitable for pumping gases?

- A Centrifugal pumps
- B Mono pumps
- C Force pumps
- D Rotor pumps

(1)

[20]

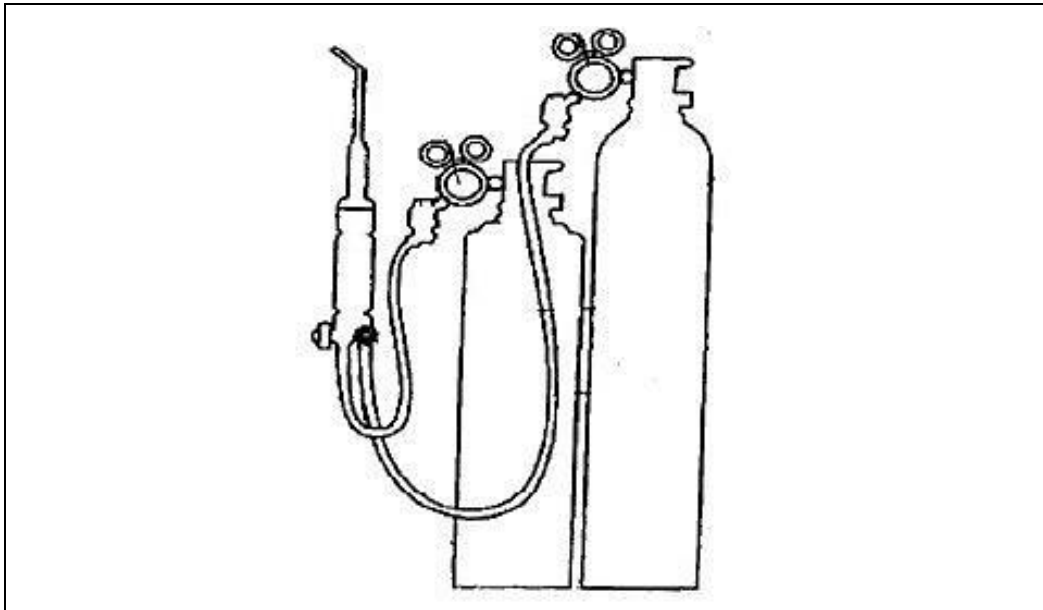
QUESTION 2: SAFETY

2.1 State ONE safety precaution that must be observed when considering each of the following:

2.1.1 Ventilation (1)

2.1.2 Lighting (1)

2.2 Name FOUR safety precautions that must be observed when handling gas cylinders.



(4)

2.3 State ONE safety precaution for transmission belts on a machine. (1)

2.4 What is the purpose of the Occupational Health and Safety Act? (1)

2.5 Which safety devices or guards are used in conjunction with shearing machines (guillotines)? (2)

[10]

QUESTION 3: TOOLS AND EQUIPMENT

- 3.1 How would you ensure the general care of your arc welding equipment? (4)
- 3.2 What is the function of an inside micro-meter? (2)
- 3.3 Explain the function of the following equipment:
 - 3.3.1 Shearing machine (1)
 - 3.3.2 Power saw (1)
- 3.4 Explain what you understand by:
 - 3.4.1 Tapping size (1)
 - 3.4.2 Clearance size in holes. (1)
- 3.5 What is the purpose of using gas welding? (1)
- 3.6 What is the function of the equipment in FIGURE 3.6 as shown below?



FIGURE 3.6

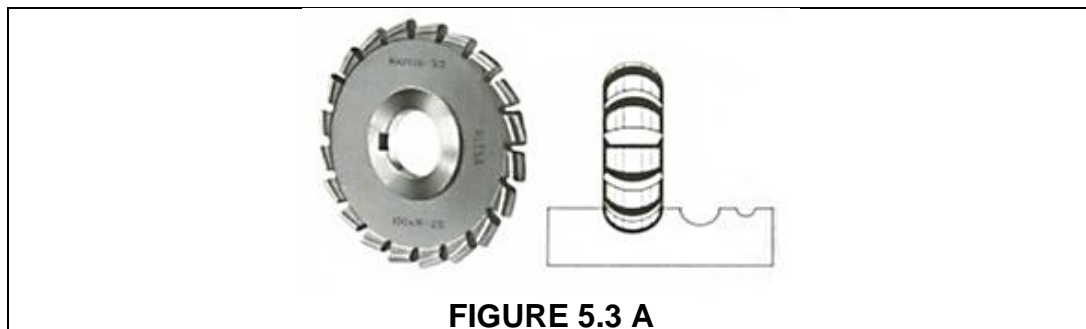
(1)
[12]

QUESTION 4: MATERIAL

- 4.1 What is meant by the term '*heat treatment*'? (2)
- 4.2 In the manufacturing of steel, different processes produce different kinds of steel. Name THREE types of steel-making furnaces that are used for the manufacturing of steel. (3)
- 4.3 Write down any TWO types of heat treatment and explain the processes thereof. (4)
- 4.4 How should an iron-based alloy be cooled to normalise heat treatment? (2)
- 4.5 Identify any TWO quenching media that are used to give different rates of cooling. (2)
- [13]**

QUESTION 5: TERMINOLOGY

- 5.1 What is *mass production*? (1)
- 5.2 Identify the TWO sketches shown in FIGURE 5.3A and FIGURE 5.3B below, which indicate the different cutting procedures on milling machines. (1)



(1)



(1)

- 5.3 Define the following indexing:
- 5.3.1 Rapid indexing (2)
- 5.3.2 Simple indexing (2)

5.4 You have to machine a gear with 88 teeth on its circumference. Use the Cincinnati dividing head and the given set of gears below, in FIGURE 5.5.

The Cincinnati dividing head											
Side 1	24	25	28	30	34	37	38	39	41	42	43
Side 2	46	47	49	51	53	54	57	58	59	62	66

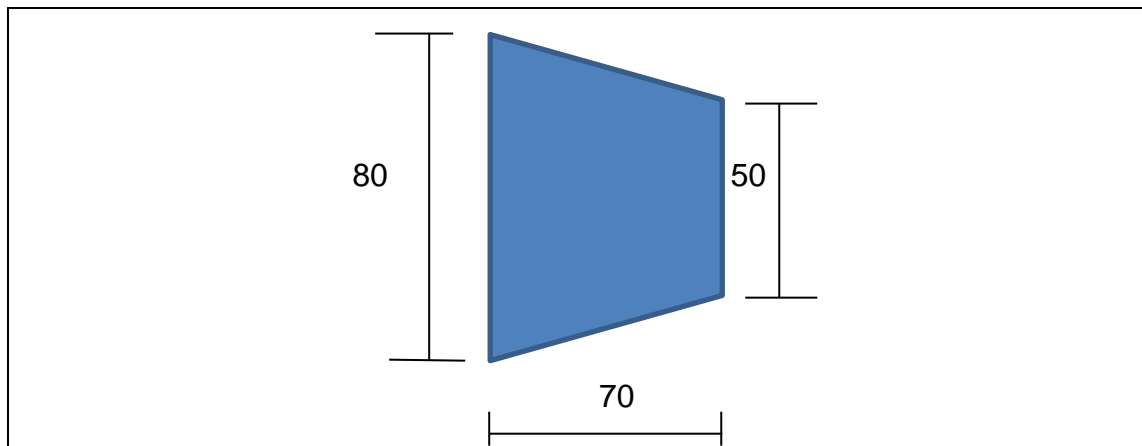
Standard change gears with the following number of teeth										
24 x 2	28	32	40	44	48	56	64	72	86	100

FIGURE 5.4

Calculate the required indexing.

(4)

5.5 A taper 70 mm long has to be turned on the end of a 80 mm diameter shaft. If the diameter of the small end of the taper is 50 mm, calculate the angle to which the compound slide must be set in order to cut this taper.



(5)

5.6 Calculate the index to cut a pentagon from a 60 mm round bar, using simple indexing.

(6)

5.7 Define the taper turning process as carried out on the lathe.

(3)

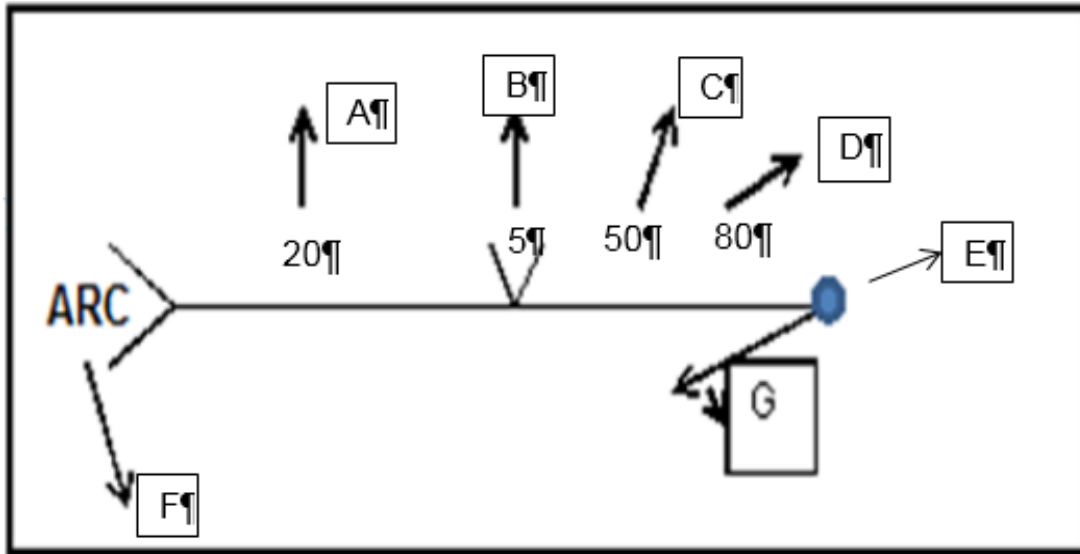
5.8 Briefly describe how you would centre a milling cutter to a work piece.

(5)

[30]

QUESTION 6: JOINING METHODS

6.1 Identify the following welding symbols from A–G as depicted on the reference lines in the drawing below.



(7)

6.2 Explain the use of the equipment in FIGURE. 6.2A and FIGURE. 6.2B respectively.

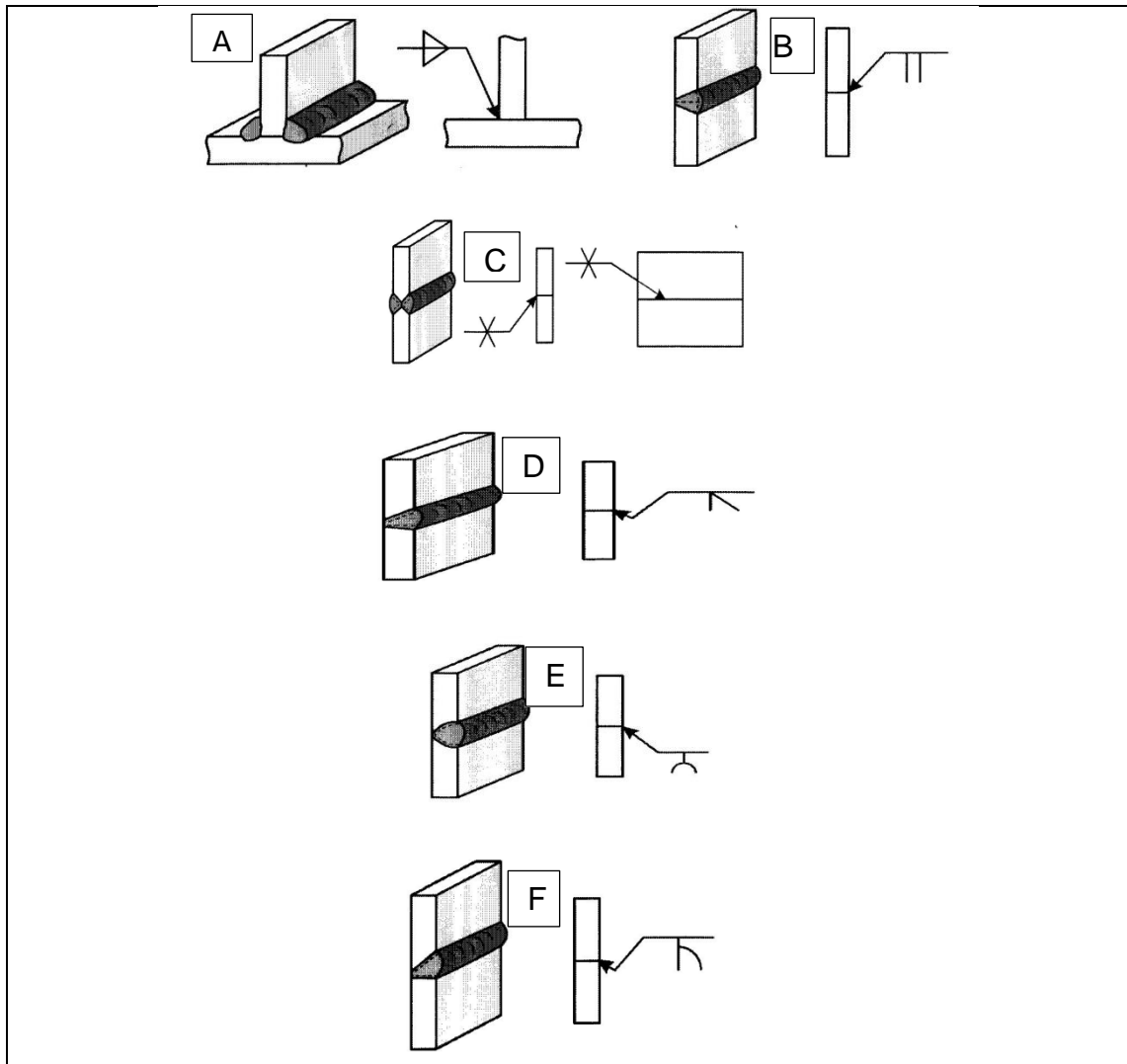


(2)

6.3 Name any FOUR factors that influence a welding joint.

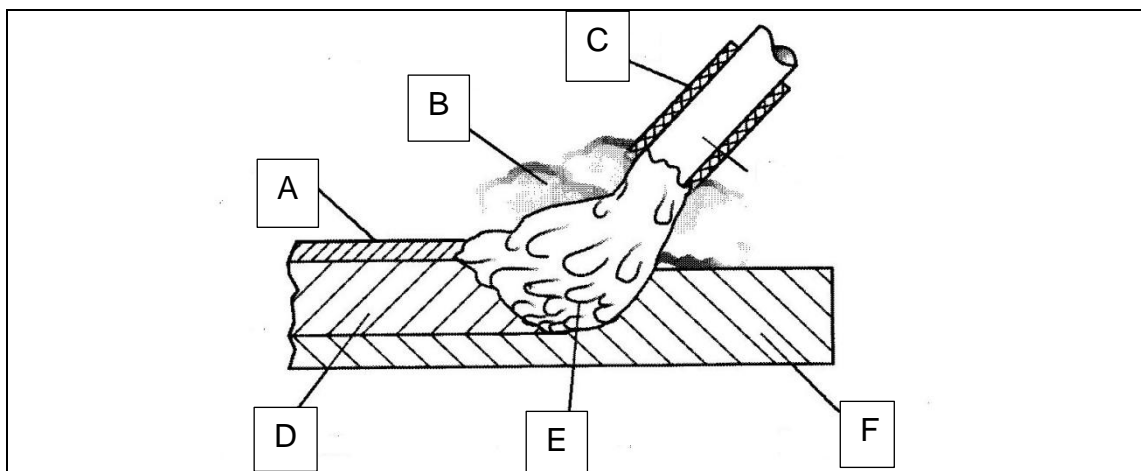
(4)

6.4 Identify the fusion welded joints in the illustrations indicated below, from A–F.



(6)

6.5 The diagram below indicates a cross-sectional view of a fusion welded joint. Identify the labels as depicted, from A–F.



(6)
[25]

QUESTION 7: FORCES

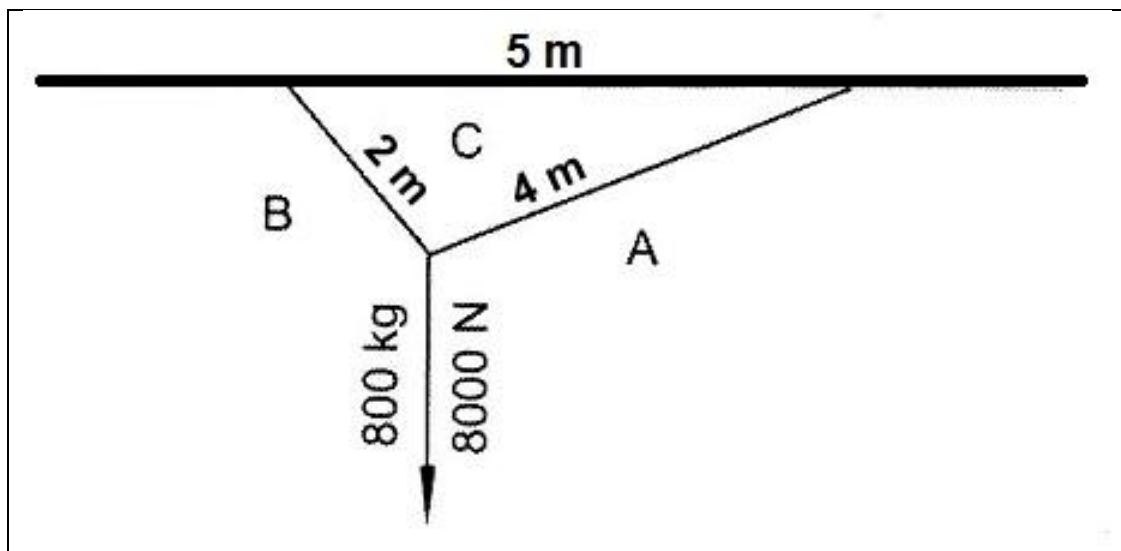
7.1 Define the following basic concepts of systems of forces:

7.1.1 Equilibrium (1)

7.1.2 Resultant (2)

7.1.3 Bow's notation (2)

7.2 The following diagram shows two slings with lengths of 2 m and 4 m attached to a body with a mass of 800 kg. The free ends of the slings are attached to two points which are 5 m apart in the same horizontal line.



7.2.1 Draw the space diagrams using the scales given below. (4)

7.2.2 Draw the vector diagram using the scale given below. (3)

7.2.3 Determine the tensions in the slings.

Use a scale for the space diagram of 1 cm = 1 m

Use a scale for the force diagram of 1 mm = 100 N (2)

7.3 FIGURE 7.3 below represents a beam which is supported at either end by RL and RR.

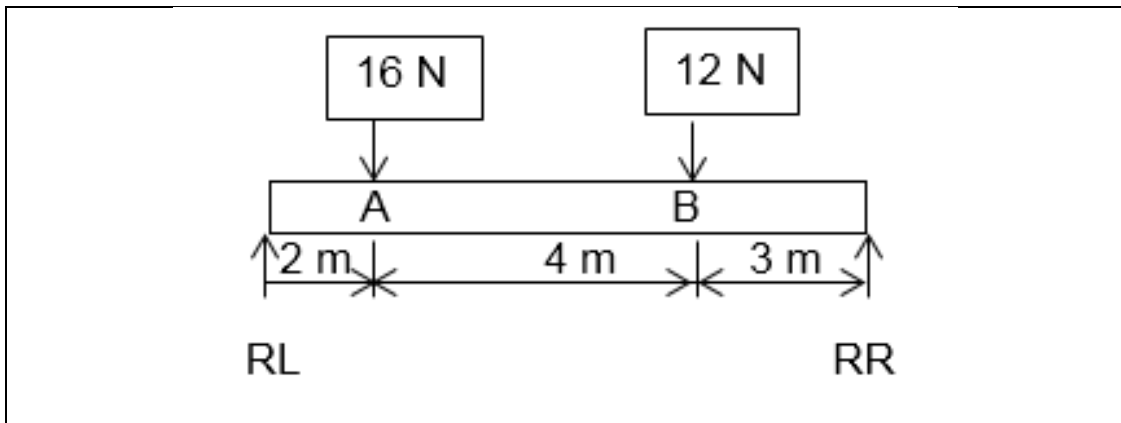


FIGURE 7.3

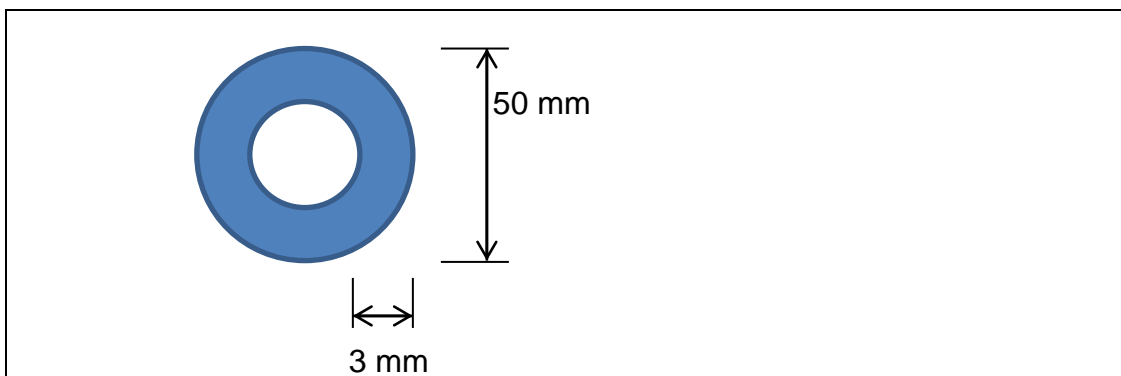
Calculate the following:

7.3.1 The magnitude of RR and RL. (4)

7.3.2 The bending moments at points A and B. (4)

7.3.3 Prove that the beam is in equilibrium. (2)

7.4 Calculate the compressive stress in a 50 x 3 mm round tube if it is subjected to a load of 70 kN.



(6)
[30]

QUESTION 8: MAINTENANCE

8.1 Explain positive camber as viewed from the front in FIGURE 8.1.

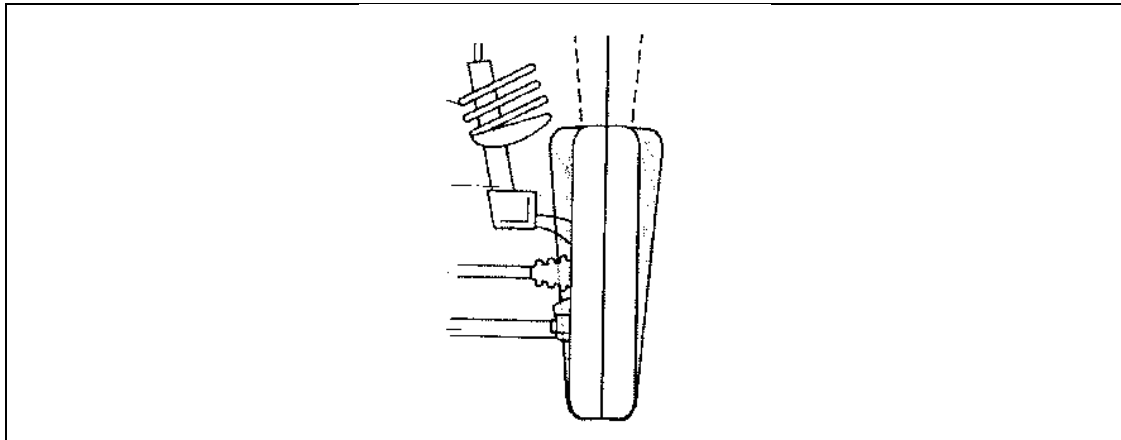


FIGURE 8.1

(2)

- 8.2 Write down any THREE important pre-checks before attempting wheel alignment. (3)
- 8.3 Explain the TWO types of balancing with regard to wheel balancing and give a description of each one. (2)
- 8.4 Give FOUR effects that cause malfunction of operating systems due to friction and the lack of maintenance. (4)
- 8.5 Most modern vehicles make use of sophisticated electronic diagnostic equipment to do fault finding. Explain the use of the engine control unit (ECU) in relation to:
- 8.5.1 Fuel system (1)
- 8.5.2 Ignition system. (1)
- 8.6 Explain what is meant by 'toe-in' with regard to wheel alignment. (2)

[15]

QUESTION 9: SYSTEM AND CONTROL

9.1 Different types of linkages are used in industry to create different motions. Give THREE reasons why linkages are used. (3)

9.2 Given a sketch of a test lamp, explain the static ignition timing step by step, with the FIGURE 9.2.

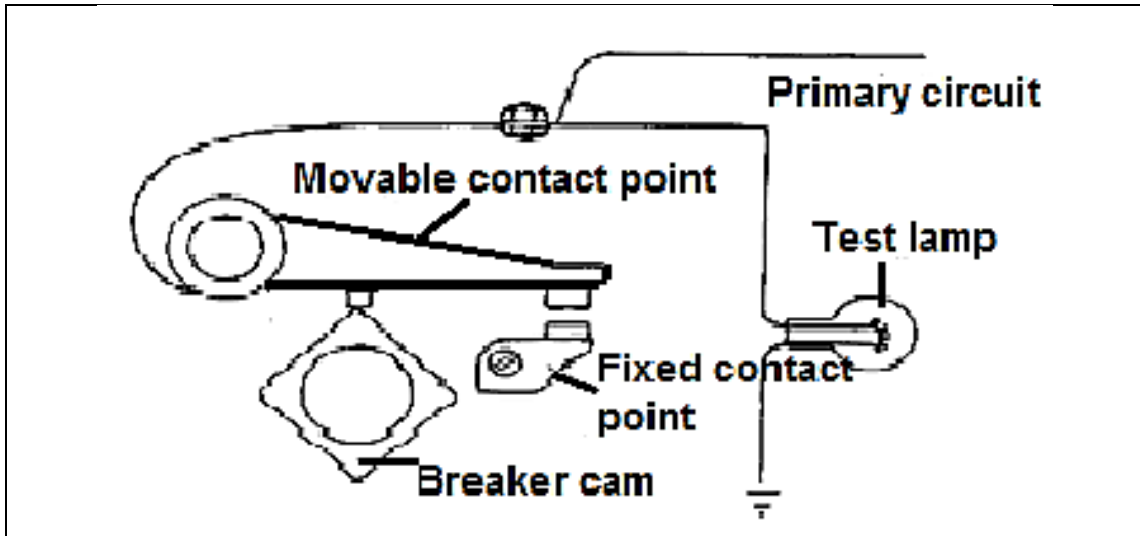


FIGURE 9.2

(5)

9.3 Calculate the rotational frequency of the driven shaft in the gear train shown below in FIGURE 9.3 and round off the answer as revs/sec.

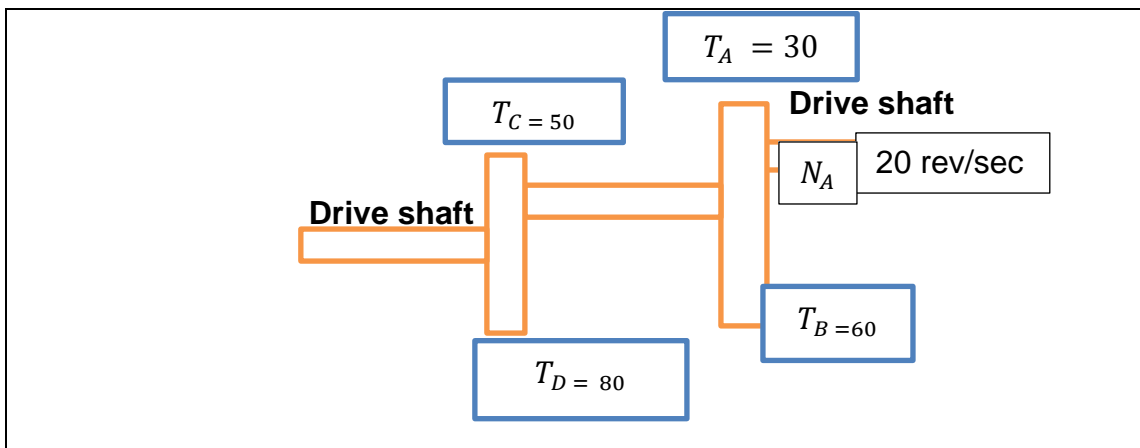
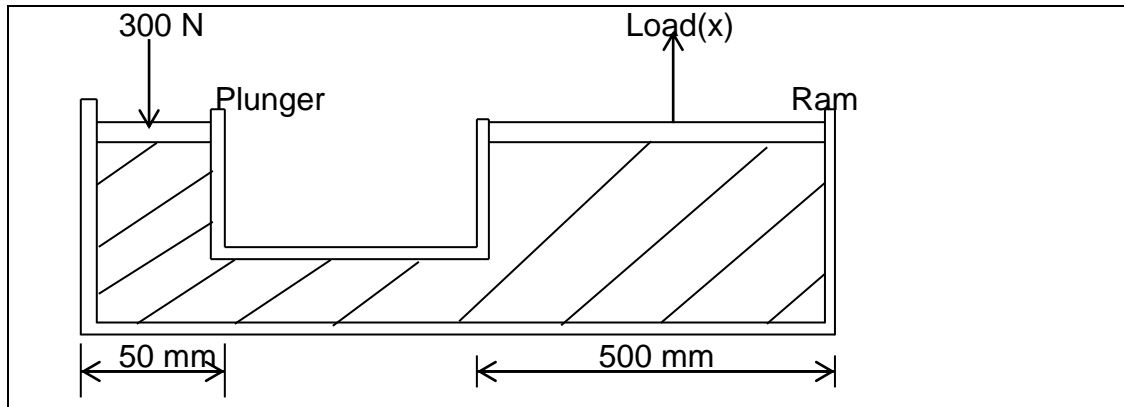


FIGURE 9.3

(6)

- 9.4 A force of 300 N is exerted on the 50 mm diameter plunger of a hydraulic jack. The diameter of the ram is 500 mm. Calculate the load (x) that can be lifted by the hydraulic jack.



(9)

- 9.5 Study the position of the following gears in FIGURE 9.5 and explain the term 'meshing gears'.



FIGURE 9.5

(2)
[25]

QUESTION 10: PUMPS

10.1 Give FIVE reasons for 'pump slip'. (5)

10.2 Describe the operating principle of a mono pump.



(4)

10.3 Write down the advantages and disadvantages of the gear pump and the rotor pump as tabled below.

GEAR PUMP	ROTOR PUMP
Advantages:	Advantages:
Disadvantages:	Disadvantages:

(4)

10.4 Explain the operating principles of a gear pump.



(4)

10.5 Write down any THREE advantages of a centrifugal pump in comparison with a reciprocating pump. (3)

[20]

TOTAL: 200

MECHANICAL TECHNOLOGY GRADE 11

FORMULA SHEET

1. GAUGE BLOCKS

Set nr. M.50

Range	increment in mm	number of blocks
1,0025 to 1,0075	0,0025	3
1,01 to 1,09	0,01	9
1,1 to 1,9	0,1	9
1 to 25	1,0	25
50; 75; 100		3
0,5		1

2. FRICTION:

 $F = \text{force of friction}$ $\mu = \text{co-efficient of friction}$ $N = \text{Normal force}$ $F = \mu \times N$

3. TORQUE: T

 $T = \text{Force} \times \text{Distance}$ were $T = \text{N.m.}$

4. BELT DRIVES

4.1	Belt speed = $\frac{\pi DN}{60}$
4.2	Belt speed = $\frac{\pi(D+t)N}{60}$ (t = belt thickness)
4.3	Belt mass/kilogram = Area \times length \times density (A = thickness \times width)
4.4	Speed ratio = $\frac{\text{Dia.of driven pulley}}{\text{Dia.of driver pulley}}$
4.5	Output speed = $\frac{\text{drive pulley}}{\text{driven pulley}} \times \frac{\text{drive pulley}}{\text{driven pulley}} \times \text{input speed}$
4.6	Open-belt length = $\frac{\pi(D+d)}{2} + \frac{(D-d)^2}{4c} + 2c$
4.7	Crossed-belt length = $\frac{\pi(D+d)}{2} + \frac{(D+d)^2}{4c} + 2c$
4.8	Power (P) = $\frac{2\pi NT}{60}$

4.9	Ratio of tight side to slack side = $\frac{T_1}{T_2}$
4.10	Power (P) = $\frac{(T_1 - T_2)\pi DN}{60}$
4.11	Width = $\frac{T_1}{\text{Permissible tensile force}}$
4.12	Dia _A x N _A = Dia _B x N _B

5. GEAR DRIVES: SPUR GEAR

5.1	Power (P) = $\frac{2\pi NT}{60}$
5.2	Gear ratio = $\frac{\text{product of driven gears teeth}}{\text{product of drive gears teeth}}$
5.3	$\frac{N_{in}}{N_{out}} = \frac{\text{product of driven gears teeth}}{\text{product of drive gears teeth}}$
5.4	Torque = force x radius
5.5	Torque transmitted = gear ratio x input torque
5.6	T _A x N _A = T _B x N _B

6. HYDRAULICS

6.1	Pressure = $\frac{\text{Force (F)}}{\text{Area (A)}}$
6.2	Volume = cross-sectional area x stroke length (ℓ or s)
6.3	Work done = force x distance

7. FORCES

7.1	Stress = $\frac{\text{Force}}{\text{Area}}$
7.2	Strain = $\frac{\text{Change in Length}}{\text{Original Length}}$

7.1	Spanning = $\frac{\text{Krag}}{\text{Oppervlakte}}$ of $(\sigma = \frac{F}{A})$
7.2	Vormverandering (ϵ) = $\frac{\text{verandering in lengte}(\Delta L)}{\text{oorspronklike lengte}(L)}$

7. SPANNING

6.1	Druk (P) = $\frac{\text{Krag (F)}}{\text{oppervlakte (A)}}$
6.2	Volume = dwarsdeursneeooppervlakte x slaglengte (l of s)
6.3	Volume = dwarsdeursneeooppervlakte x slaglengte (l of s)

6. HIDROULIKA

5.1	Drywing (P) = $\frac{2\pi NT}{60}$
5.2	Ratverhouding = $\frac{\text{produk van die aantal tande op gedrewe ratte}}{\text{produk van die aantal tande op dryfratte}}$
5.3	$\frac{N_{in}}{N_{uit}} = \frac{\text{produk van die aantal tande op die gedrewe ratte}}{\text{produk van die aantal tande op dryfratte}}$
5.4	Wingekrag = $\text{krag} \times \text{radius}$
5.5	Wingekrag oorgeeda = $\text{ratverhouding} \times \text{insetwingkrag}$
5.6	$T_A \times N_A = T_B \times N_B$

5. RATAANDRYWINGS: REGUTTANDRAT

4.9	Verhouding tussen die stywe en slap kant = $\frac{T_1}{T_2}$
4.10	Drywing (P) = $\frac{(T_1 - T_2) \pi DN}{60}$
4.11	Wyde = $\frac{T_1}{\text{Toelaatbare trekkrag}}$
4.12	$D_{1A} \times N_A = D_{1B} \times N_B$

MEGANIESE TECHNOLOGIE GRAAD II

FORMULEBLAD

1. MAATBLOKKIES:

Stel nr. M.50

Reeks	toename in mm	getal blokkies
1,0025 tot 1,0075	0,0025	3
1,01 tot 1,09	0,01	9
1,1 tot 1,9	0,1	9
1 to 25	1,0	25
50; 75; 100		3
0,5		1

2. WRYPING:

 $F = \text{wrywingskrag}$ $\mu = \text{wrywingskoeffisiënt}$ $N = \text{Normaalkrag}$ $F = \mu \times N$

3. WRINGKRAG (TORSIE) T:

 $T = \text{Krag x Afstand}$ waar $T = N.m$

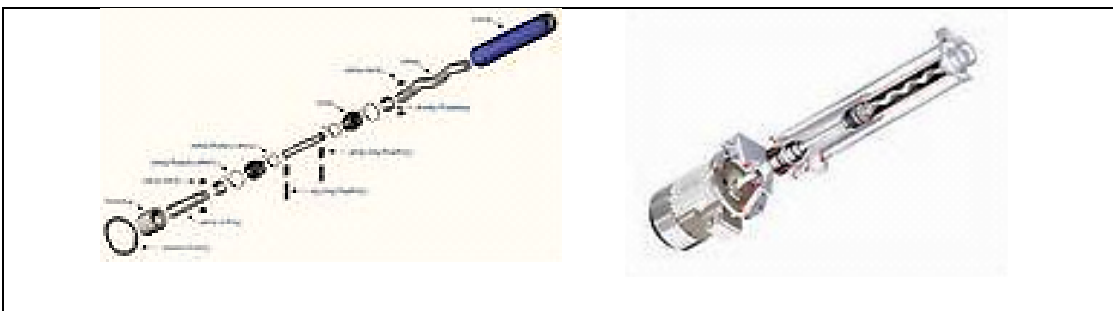
4. BANDAANDRYWINGS

4.1	$\text{Bandspoed} = \frac{\pi DN}{60}$
4.2	$\text{Bandspoed} = \frac{\pi(D+t)N}{60}$ (t = banddikte)
4.3	Bandmassa/kilogram = Area × lengte × digtheid (A = dikte × wydte)
4.4	$\text{Spoedverhouding} = \frac{\text{Dia van gedrewe katrol}}{\text{Dia van dryfkatrol}}$
4.5	$\text{Uitsetspoed} = \frac{\text{dryfkatrol}}{\text{gedrewe katrol}} \times \frac{\text{dryfkatrol}}{\text{gedrewe katrol}} \times \text{insetspoed}$
4.6	$\text{Opbandlengte} = \frac{\pi(D+d)}{2} + \frac{(D-d)^2}{4c} + 2c$
4.7	$\text{Gekruisdebandlengte} = \frac{\pi(D+d)}{2} + \frac{(D+d)^2}{4c} + 2c$
4.8	$\text{Drywing (P)} = \frac{2\pi NT}{60}$

VRAAG 10: POMPE

10.1 Noem VYF redes vir 'pompsyfering'; (5)

10.2 Beskryf die werksbeginsel van 'n monopomp.



(4)

10.3 Skryf die voordele en nadele van die rat- en rotor-tipe pompe in die onderstaande tabel neer.

RATPOMP	ROTOR-TIPEPOMP
Voordele:	Voordele:
Nadele:	Nadele:

(4)

10.4 Verduidelik die werksbeginsels van 'n ratpomp.



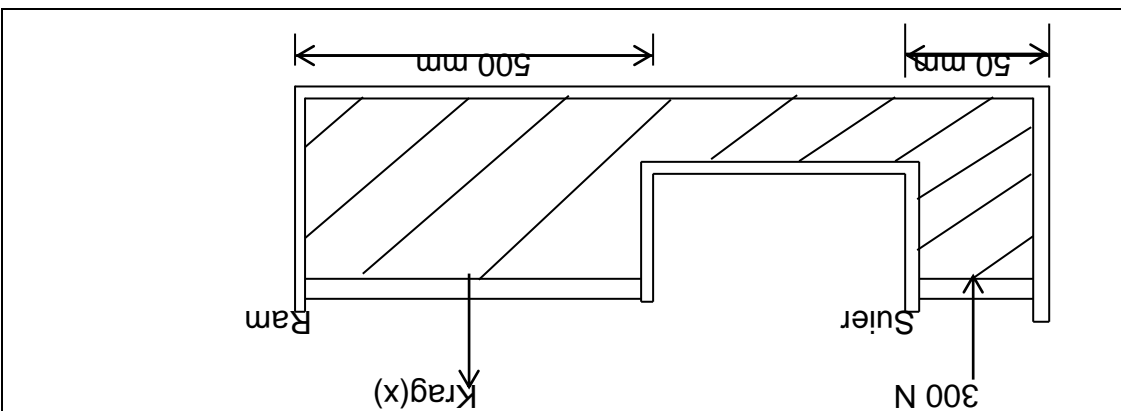
(4)

10.5 Noem enige DRIE voordele van 'n sentrifugale-tipe pomp in vergelyking met 'n suierpomp.

[20]
(3)

TOTAAL: 200

- 9.4 'n Krag van 300 N word op 'n 50 mm suier van 'n hidroliese pers toegepas. Die diameter van die ram is 500 mm. Bereken die krag (x) wat deur die hidroliese pers gelig kan word.



(9)

- 9.5 Bestudeer die posisie van die rat hieronder in FIGUR 9.5 en verduidelik die term 'inkomende ratte'.



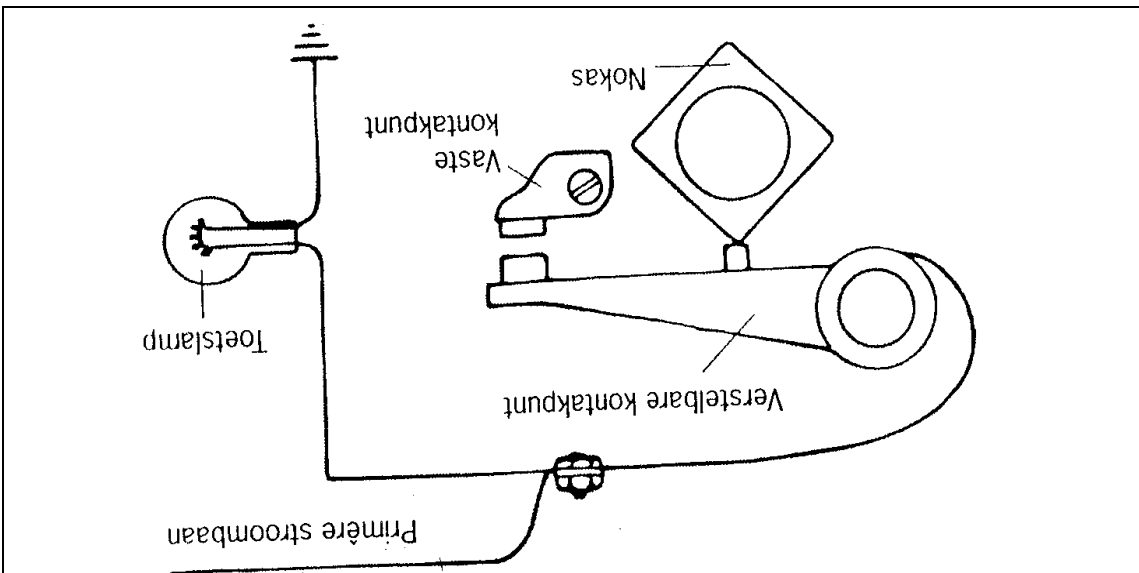
FIGUR 9.5

[25]
(2)

VRAAG: STELSEL EN BEHEER

9.1 Verskillende tipes koppelaars word in industrie gebruik om verskillende bewegings saam te stel. Gee DRIE redes waarom koppelaars gebruik word. (3)

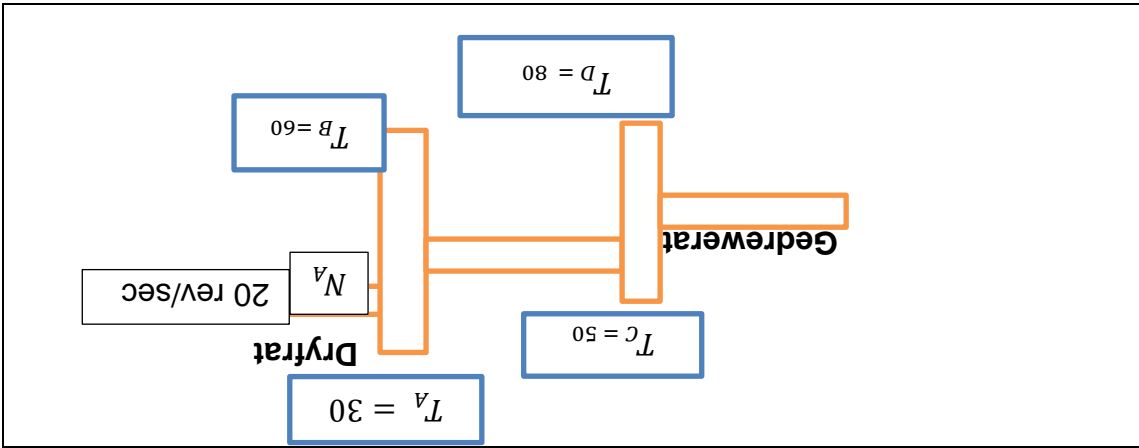
9.2 Gee 'n skets van 'n toetslamp, verduidelik die statiese aansakelaarstelsel stap vir stap met die skets in FIGUR 9.2 hieronder.



(5)

FIGUR 9.2

9.3 Bereken die draaifrekwensie van die gedrewe staaf in die ratte in hieronder in FIGUR 9.3 en rond die antwoord as rev/sek tot twee desimale plekke af.

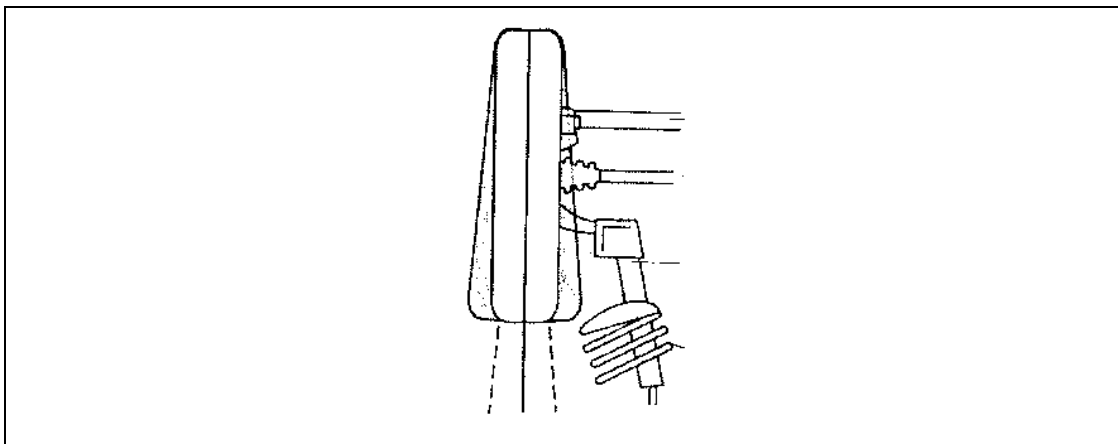


(6)

FIGUR 9.3

VRAAG 8: INSTANDHOUDING

8.1 Verduidelik positiewe wervlug soos aangedui vanaf die voorkant in die onderstaande FIGUR 8.1 hieronder.



(2)

8.2 Skryf enige DRIE belangrike voorafondersoeke voordat jy jou wiesporing wil aandurf.

(3)

8.3 Verduidelik die TWEË tipes balansering met betrekking tot wielbalansering en gee 'n beskrywing van elk.

(2)

8.4 Noem VIER effekte wat onklaaraking in bedryfstelsels veroorsaak deur middel van wrywing en die gebrek aan instandhouding.

(4)

8.5 Die meeste moderne voertuie gebruik gesofistikeerde elektroniese diagnostiese toerusting om foute op te spoor. Verduidelik die gebruik van die enjinbeheereenheid met verwysing na die volgende:

8.5.1 Brandstof-toevoerstelsel

(1)

8.5.2 Ontstekingsstelsel.

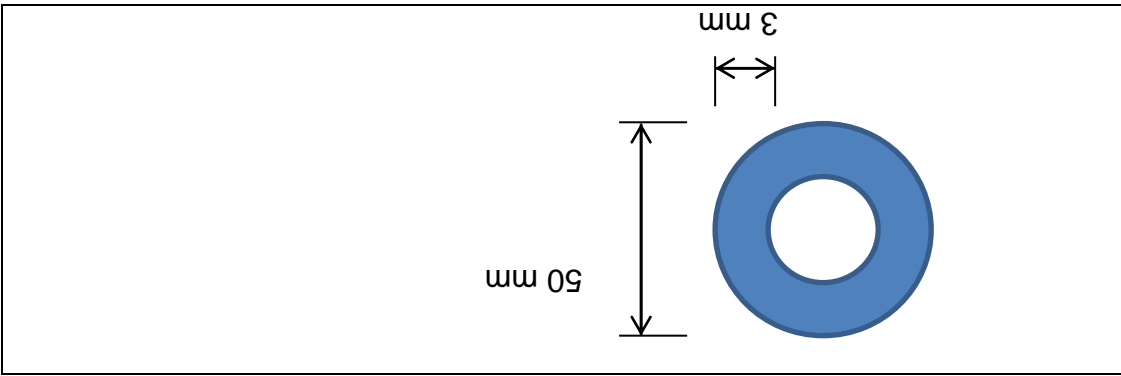
(1)

8.6 Verduidelik wat bedoel word met '*toesporing*' met betrekking tot wiesporing.

(2)

[15]

[30]
(6)

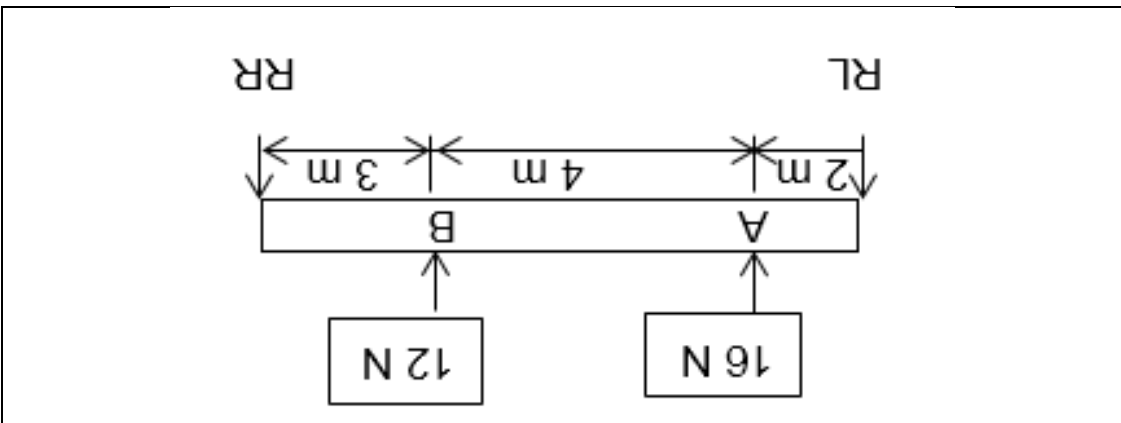


7.4 Bereken die drukspanning in 'n 50 x 3 mm ronde staaf, indien dit aan 'n krag van 70 kN onderworpe is.

- 7.3.3 Bewys dat die balk in ewewig is. (2)
- 7.3.2 Die buigmoment by punte **A** en **B**. (4)
- 7.3.1 Die grootte van **RR** en **RL**. (4)

Bereken die volgende:

FIGUR 7.3



7.3 Die onderstaande FIGUR 7.3 dui 'n balk aan wat aan beide kante deur **RL** en **RR** gestut word.

VRAAG 7: KRAAGTE

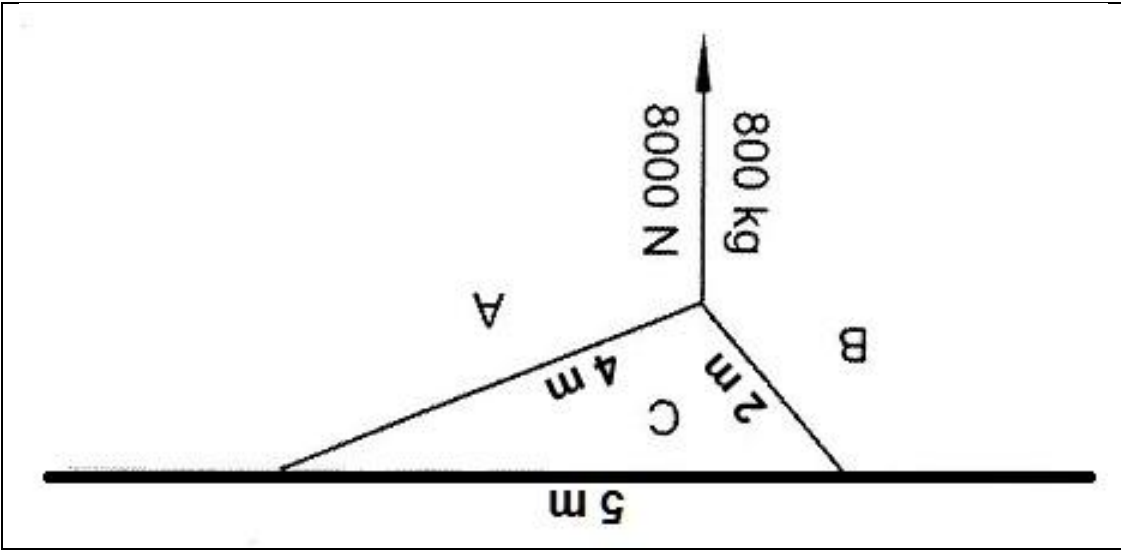
7.1 Definieer die volgende basiese begrippe van sisteme van kragte hieronder:

7.1.1 Ewigig (1)

7.1.2 Resultante (2)

7.1.3 Bow se notasie (2)

7.2 Die volgende diagram toon 2 toue met lengtes 2 m en 4 m onderskeidelik wat aan 'n voorwerp met 'n massa van 800 kg geheg is. Die vry ente van die toue is aan die 2 punte geheg, 5 m van mekaar op dieselfde horisontale vlak.



7.2.1 Teken die ruimtediagramme, met gebruik van die gegewe skale hieronder. (4)

7.2.2 Teken die vektordiagram met gebruik van die gegewe skale hieronder. (3)

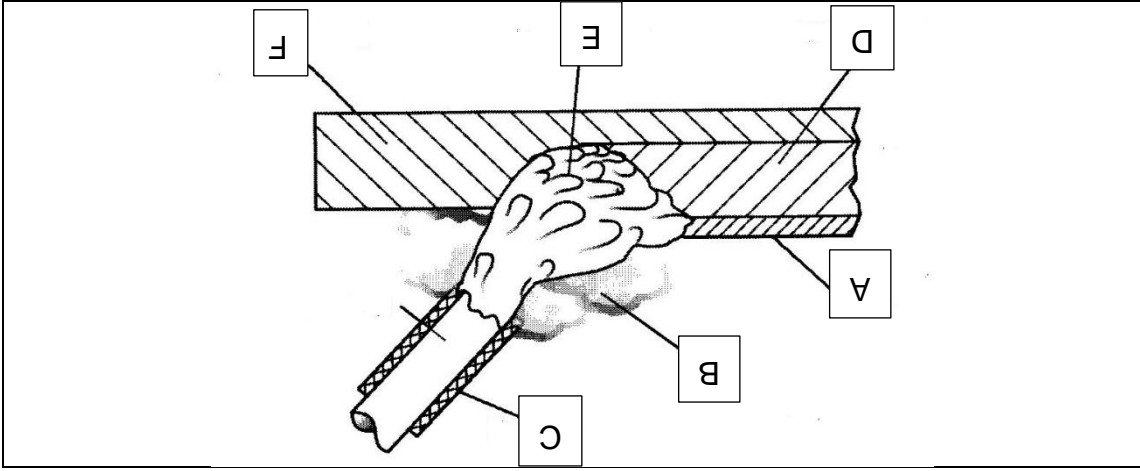
7.2.3 Bereken die spanning in die toue. (2)

Gebruik die skaal vir die ruimtediagram van 1 cm = 1 m

(2) Gebruik die skaal vir die kragtediagram van 1 mm = 100 N

6.5

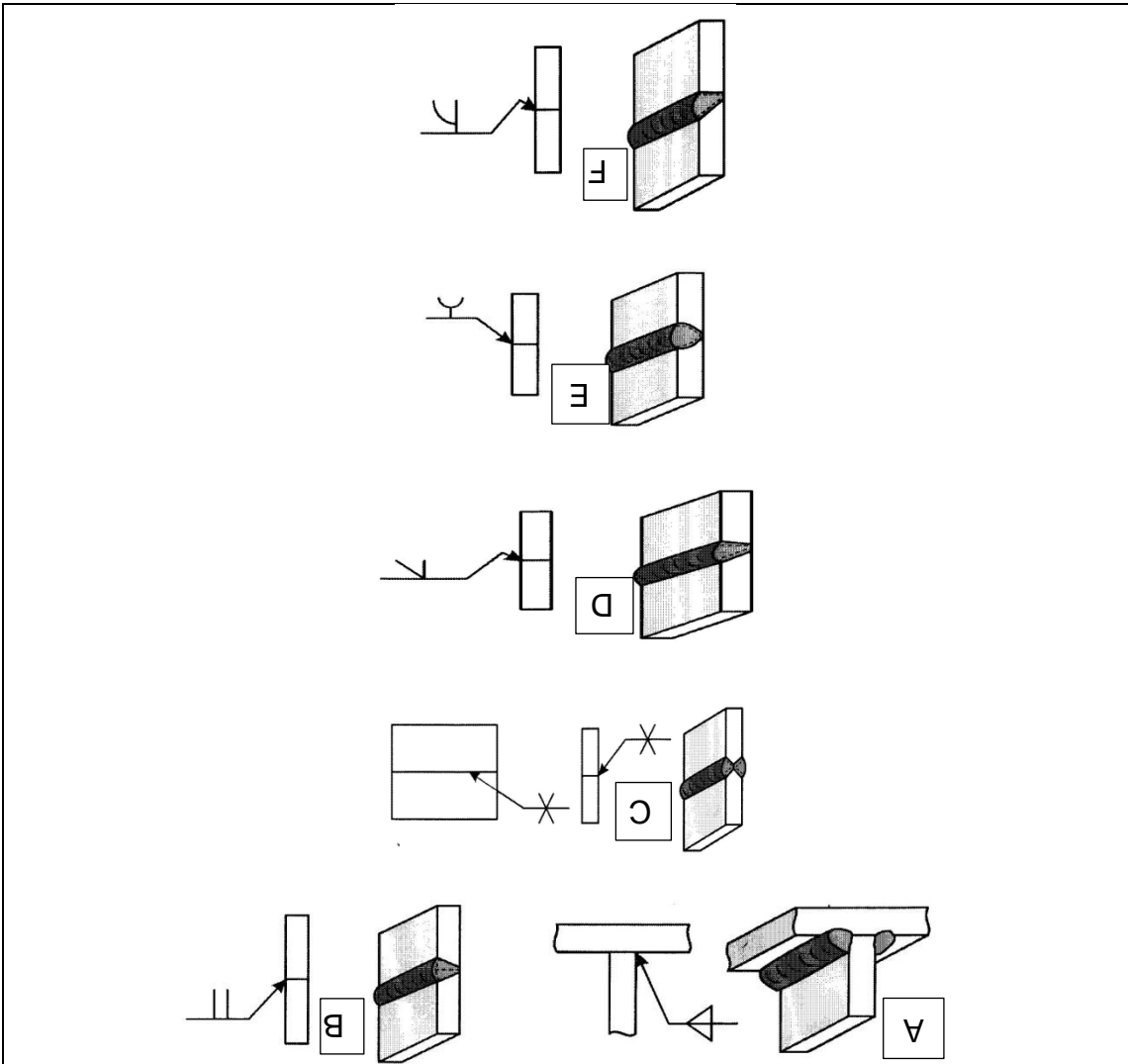
Die onderstaande diagram verwys na 'n deursnit van 'n smeltswelas. Identifiseer die dele hieronder vanaf A-F.



[25]
(9)

6.4

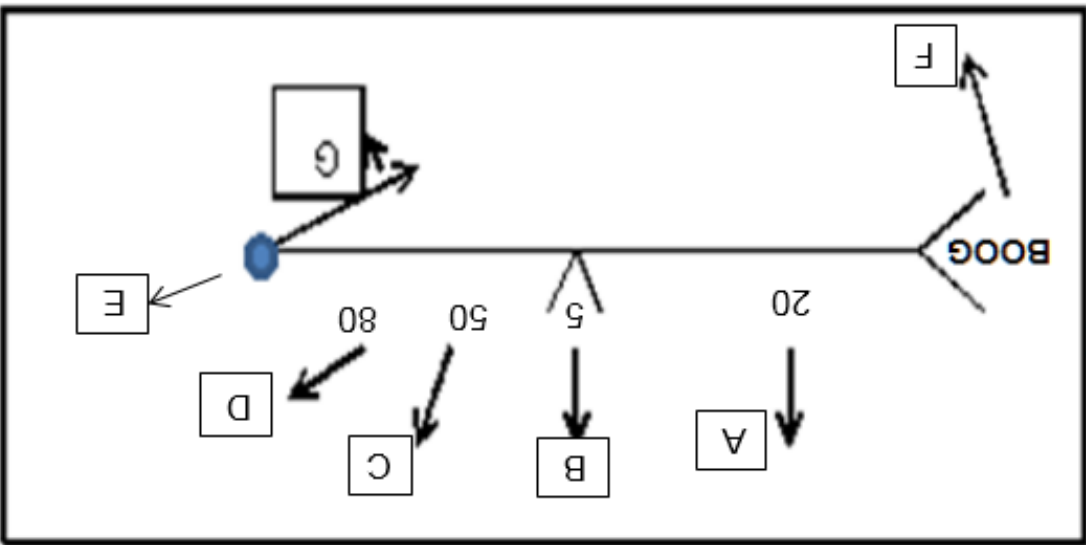
Identifiseer die smeltswelssoorde in die illustrasies soos hieronder vanaf A-F aangedui.



(9)

VRAAG 6: LASMETODES

6.1 Identifiseer die volgende sweissimbole van A-G soos aangedui op die verwysingslyn in die skets hieronder.



(7)

6.2 Verduidelik die gebruik van die toerusting in FIGUUR 6.2A en FIGUUR 6.2B onderskeidelik.



FIGUUR 6.2B

FIGUUR 6.2A

(2)

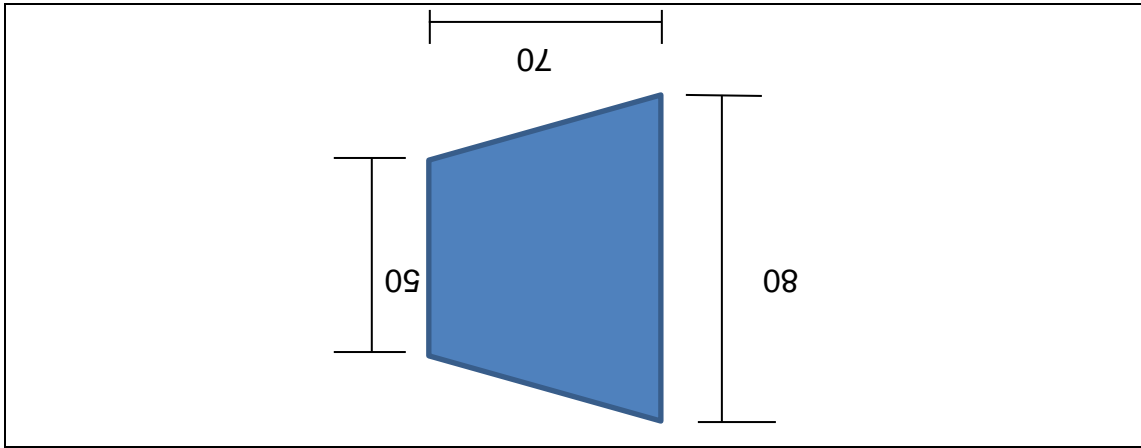
6.3 Noem enige VIER faktore wat 'n invloed op 'n sweisslas het.

(4)

[30]

- 5.8 (5) Beskryf kortliks hoe jy 'n freessnybeitel op 'n werkstuk sal sentreer.
- 5.7 (3) Definieer die tapsdraai-proses wat op die draaibank uitgeoefen word.
- 5.6 (6) Bereken die indeksering om 'n vyfhoek (pentagon) te sny uit 'n 60 mm ronde staaf deur van eenvoudige indeksering gebruik te maak.

(5)



- 5.5 (4) 'n Taps van 70 mm moet op 'n 80 mm diameter staaf gedraai word. Indien die diameter van die klein ent van die taps, 50 mm is, bereken die hoek waarteen die beitelsteeg gestel moet word om die taps te sny.
- Bereken die vereiste indeksering.

FIGUR 5.4

Die Cincinnati gatsirkel											
Sy 1	24	25	28	30	34	37	38	39	41	42	43
Sy 2	46	47	49	51	53	54	57	58	59	62	66

Standaardwisselrattē											
24 x 2	28	32	40	44	48	56	64	72	86	100	

- 5.4 Jy moet 'n rat met 88 tande op sy omtrek sny. Gebruik die Cincinnati verdeelkop en die gegewe stel rattē in FIGUR 5.5 hieronder.

VRAAG 4: MATERIALE

- 4.1 Wat word bedoel met die term 'hittebehandeling'?
- 4.2 In die vervaardiging van staal, word verskillende prosesse gebruik om verskillende soorte staal te produseer. Noem DRIE soorte onde wat gebruik word vir die vervaardiging van staal.
- 4.3 Meld enige TWEE tipes hittebehandeling en verduidelik die betrokke prosesse.
- 4.4 Hoe moet 'n ysterhoudende legeringsstaal afgekoel om hittebehandeling te normaliseer?
- 4.5 Identifiseer enige TWEE blusmedia wat gebruik kan word om verskillende tempo's van afkoeling te gee.
- [13]

VRAAG 5: TERMINOLOGIE

- 5.1 Wat is *massaproduksie*?
- 5.2 Identifiseer die twee sketse hieronder in FIGUR 5.3A en FIGUR 5.3B en duid die verskillende prosedure op die freemasjien aan.



5.3 Definieer die volgende indksering:

- 5.3.1 Snel-indksering (2)
- 5.3.2 Eenvoudige-indksering (2)

VRAAG 3: GEREDSKAP EN TOERUSTING

3.1 Hoe verseker jy die algemene instandhouding van jou boogswemassjien? (4)

3.2 Wat is die funksie van 'n binne-mikrometer? (2)

3.3 Verduidelik die funksie van die volgende toerusting:

3.3.1 Snymasjien (1)

3.3.2 Kragstae (1)

3.4 Verduidelik jou begrip van die volgende:

3.4.1 Moerdraadgrootte (1)

3.4.2 Vryruimtegrootte (1)

3.5 Waarvoor word gasswemswerk gebruik? (1)

3.6 Wat is die funksie van die toerusting in onderstaande FIGUR 3.6? (1)



FIGUR 3.6

[12]
(1)

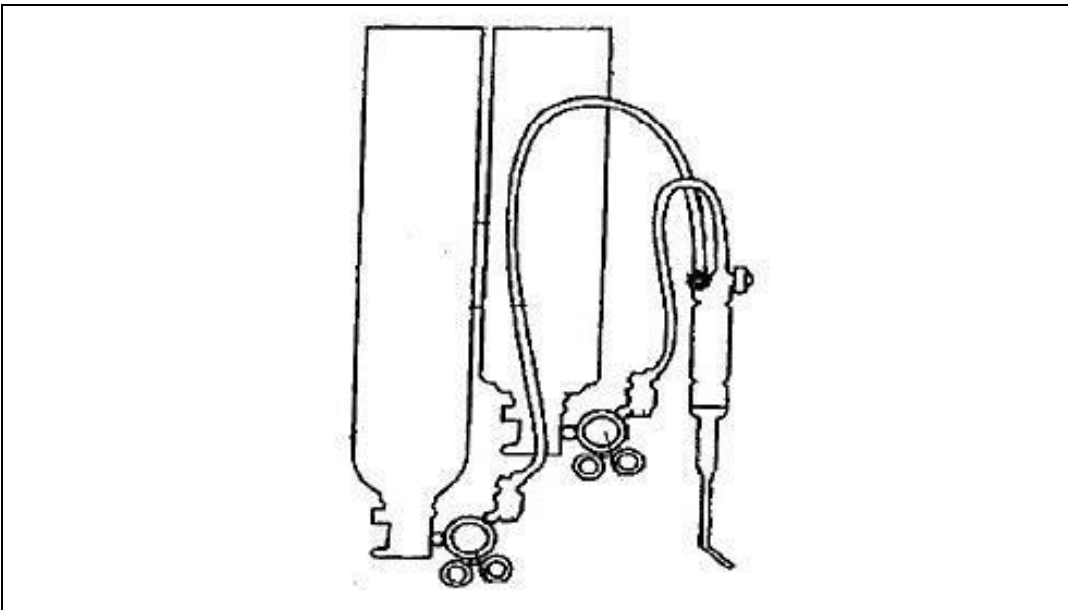
VRAAG 2: VEILIGHEID

2.1 Noem EEN veiligheidsmaatregel wat by elk van die volgende gevalle gehandhaaf moet word:

2.1.1 Ventilasie (1)

2.1.2 Beligting (1)

2.2 Noem VIER veiligheidsmaatreëls wat met die hantering van gassilinders gehandhaaf moet word.



(4)

2.3 Meld EEN veiligheidsmaatregel met ratkasbande op 'n masjien. (1)

2.4 Wat is die doel van die Wet op Beroepsgeondheid en Veiligheid? (1)

2.5 Watter veiligheidsstelle of skerms word met knip- of snymasjiene (guillotines) gebruik? (2)

[10]

[20]
(1)

- A Sentrifugale pompe
 B Monopompe
 C Kragpompe
 D Rotor-tipe pompe

1.20 Water EEN van die volgende is NIE geskik om gasse te pomp NIE?

(1)

- A 1 500 Pa
 B 1 250 Pa
 C 2 500 Pa
 D 5 200 Pa

1.19 Gestel 'n suier reageer op 'n vloeistof met 'n krag van 6 250 N en die area van die suier is 2,5 m². Bepaal die druk in die vloeistof. Kies die korrekte antwoord.

1.16 Identifiseer die presisiegereedskapstuk in FIGUR 1.16 hieronder.



FIGUR 1.16

- A Binnemikrometer
- B Buitemikrometer
- C Skroefdraadmikrometer
- D Dieptemikrometer

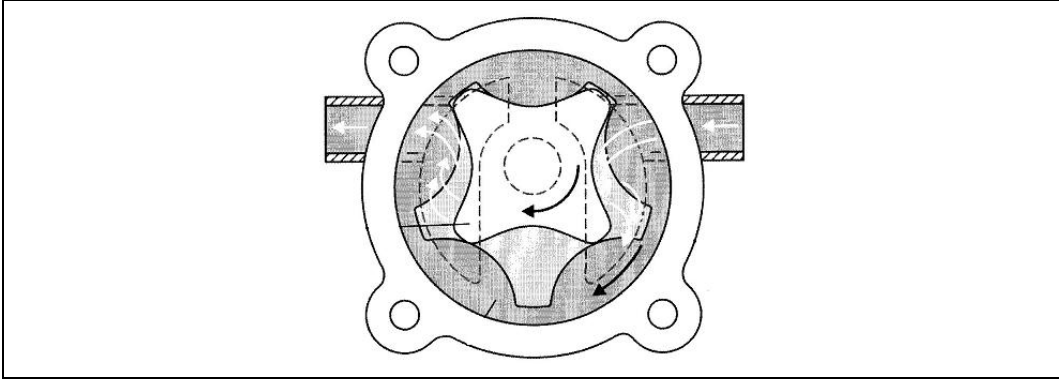
(1)

1.17 Windaangedrewe kleppe kan geklassifiseer word in drie algemene groepe. Watter EEN van die volgende word NIE as 'n windaangedrewe klepkategorie beskou NIE?

- A Nasienkleppe
- B Afleiersklep
- C Drukvermindersklep
- D Voetklep

(1)

1.18 Identifiseer die pomp in die illustrasie FIGUR 1.17 hieronder.



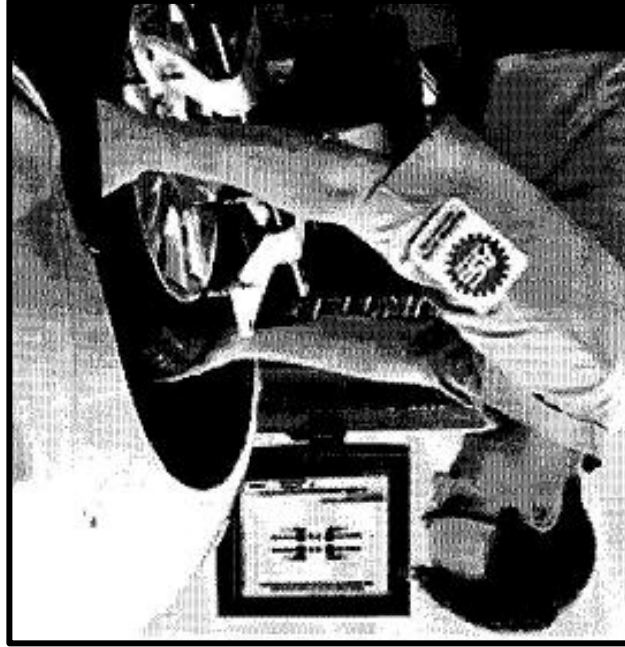
FIGUR 1.17

- A Ratspomp
- B Wiekpomp
- C Rotorpomp
- D Suierpomp

(1)

- A wêlbalansering
- B dinamiese balansering
- C wêlsporing
- D statiese sporing

(1)



1.15 Die illustrasie hieronder dui aan dat 'n tegnikus die wiele van 'n motorvoertuig beskou, om ... vas te stel. Kies die korrekte antwoord.

- A verdragting.
- B wêlsporing.
- C dienssklus.
- D lewensduur.

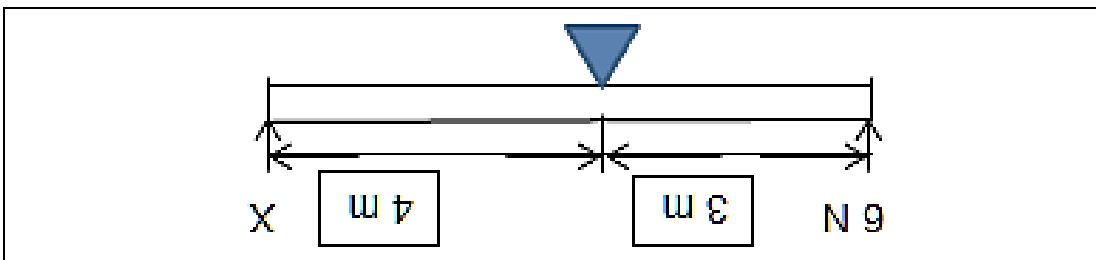
(1)

1.14 Voitooi die volgende sin. Die persentasie tyd wat voorgeskryf is deur die fabrikant vir die gebruik van 'n masjien word ... genoem.

- A 4 N/m
- B 4,5 N/m
- C 14,5 N/m
- D 4,15 N/m

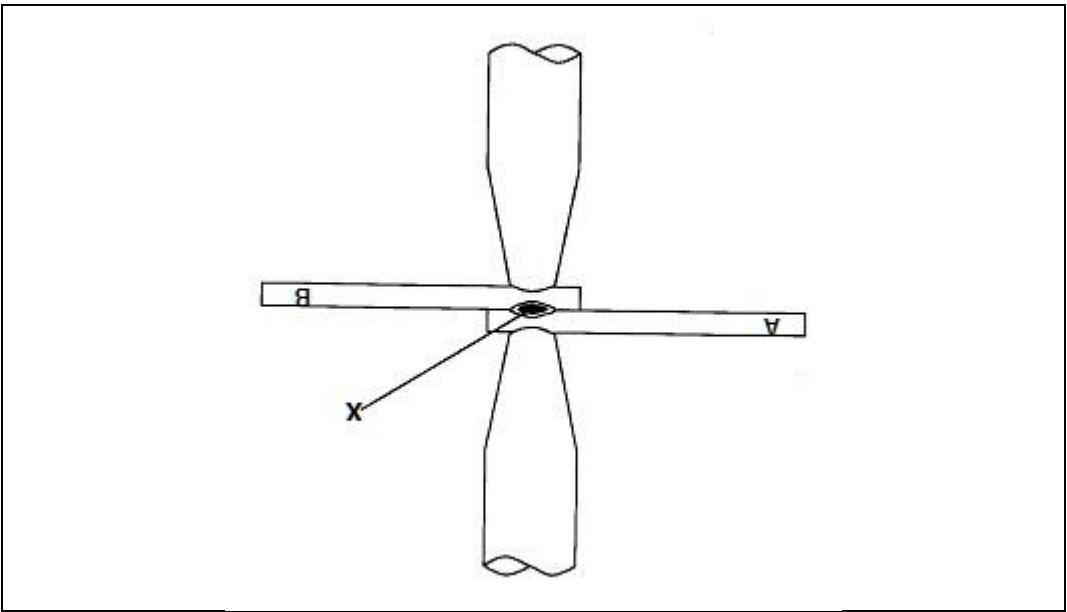
(1)

FIGUR 1.13



1.13 Bereken krag X in FIGUR 1.13 hieronder. Kies die korrekte antwoord.

1.11 Identifiseer die swisproses in die illustrasie hieronder in FIGUR 1.11.

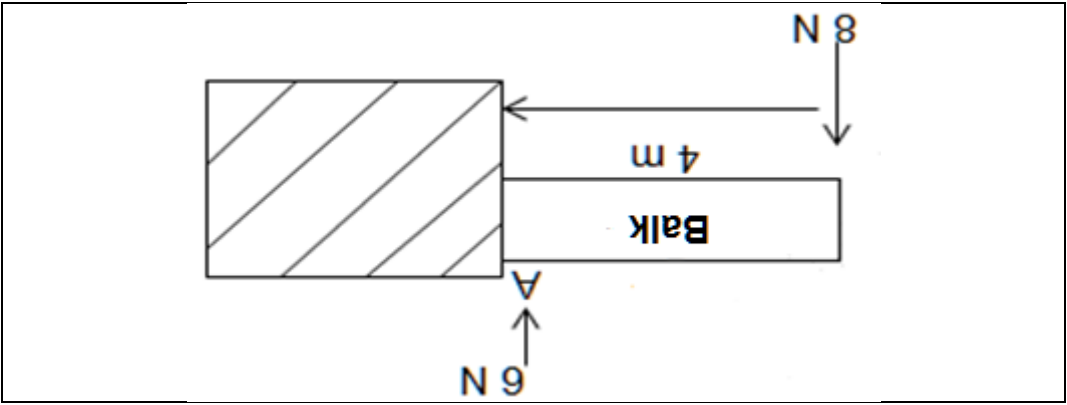


FIGUR 1.11

- A Hegswearing
- B Skraapswearing
- C Puntswearing
- D Tikswearing

(1)

1.12 Bereken die buigmoment by punt A (BM A) in FIGUR 1.12 hieronder. Kies die korrekte antwoord.



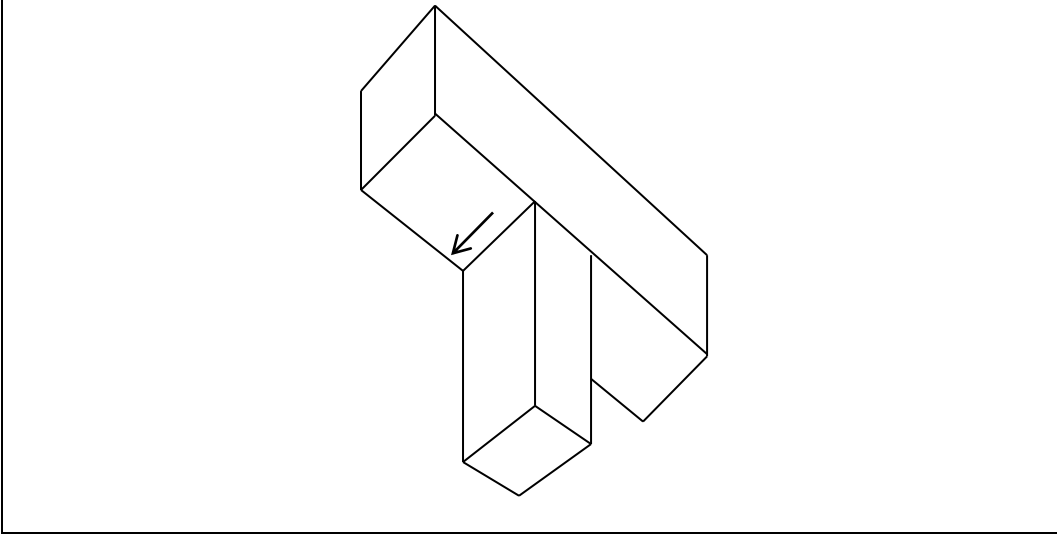
FIGUR 1.12

- A 6 N
- B 12 N
- C 32 N
- D 48 N

(1)

- A Plat posisie
 - B Vertikale posisie
 - C Horisontale posisie
 - D Skuins posisie
- (1)

FIGUR 1.9



- 1.10 Identifiseer die swessimbool posisie soos in FIGUR 1.9 hieronder aangedui.
- A Eenvoudige indksering
 - B Hoekige indksering
 - C Differentisiele indksering
 - D Geeneen van bogenoemde
- (1)
- 1.9 Water EEN van die volgende indkseringmetodes kan gebruik word om 'n rat met 98 tande te sny?
- A 2 draaie en 2 gate in 'n 49-gat sirkel.
 - B 2 draaie en 9 gate in 'n 49-gat sirkel.
 - C 1 draai en 13 gate in 'n 49-gat sirkel.
 - D 2 draaie en 1 gat in 'n 49-gat sirkel.
- (1)
- 1.8 Bereken die indksering vir 'n rat met 98 tande. Kies die korrekte antwoord.

1.4 Watter van die volgende aktiwiteite is NIE toepaslik met die gebruik van wringsleutels NIE?



- 1.5 Die definisie van plastisiteit verwys na ...
- A Om silinderkopboute of moere vas te maak.
 - B Om die wiellaer moere vas te maak.
 - C Om die agteras te monteer.
 - D Om die verstelling van die alternator te skraag.

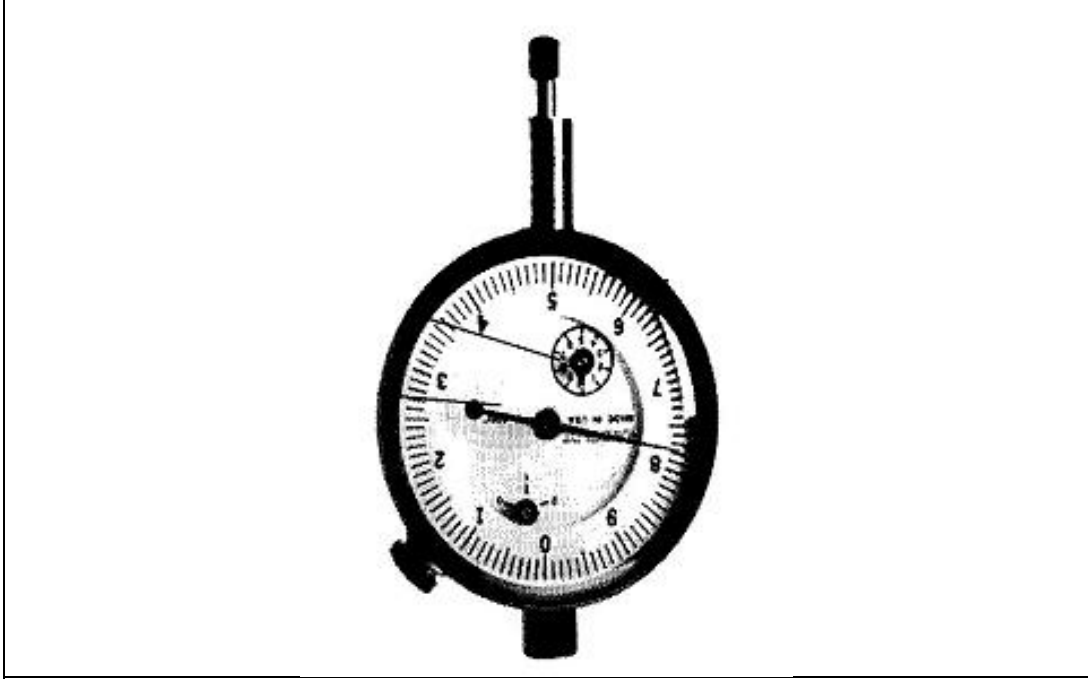
- 1.6 Voltooi die verklaaring: Voorloopige uitgloeiing van gietstaal ...
- A die vermoë van materiaal om kragte te absorbeer en te buig in verskillende rigtings en om na die oorspronklike grootte terug te beweeg.
 - B materiaal se vermoë om van vorm te verander deur verrekking in die lengte of om na draad gerek te kan word.
 - C materiaal se vermoë om sy vorm permanent te verander.
 - D materiaal se vermoë om skok te weerstaan en sy vorm na aanhoudende buiging in verskillende rigtings te behou.

- 1.7 Die metrieke stelsel van eenhede was gestandaardiseer en gemoderniseer. Waarvoor staan die afkorting SI?
- A verlig spanning.
 - B verhard die metaal.
 - C maak boor- en slypwerk onmoontlik.
 - D verminder die kritiese temperatuur.

- (1) Internasionale sisteme van eenheid
- A Internasionale sisteme van eenhede
 - B Internasionale sisteme van unies
 - C Internasionale stelsel van eenhede
 - D Internasionale sisteme van Verenigde State

- A Om vas te stel of 'n krukas gebuig is.
 B Om vas te stel of 'n krukas vier joernale het.
 C Om vas te stel of 'n werksstuk op 'n draaibank eweredig draai.
 D Om die entspelling op 'n krukas te bepaal.

(1)



- 1.3 Watter verklaring word NIE toegepas met die gebruik van 'n wyser(plaat)meter NIE?
 A 'n Operateur moet opgelei wees om die apparaat veilig te hanteer.
 B Die isolering van die elektriese verlengkooorde moet in goeie toestand wees.
 C Geen atskortings word in die werkswinkel benodig nie.
 D Die sweiser moet volledig met beskermende drag geïsoleer word.
- 1.2 Gegee is die volgende veiligheidsvoorsorgmaatreëls vir 'n swais- en vlam- sny bewerking. Watter maatreël is NIE van toepassing NIE?
 A Swak huishouding
 B Verkeerdlike gebruik van gereedskap
 C Loshangende kleure
 D Installering van masjiene
- 1.1 Watter EEN van die volgende is NIE 'n oorsaak van ongelukke NIE?

(1)

VRAAG 1: MEERVOUDIGEKEUSE-VRAE

INSTRUKSIES EN INLIGTING

1. Skryf jou naam en van in die betrokke spasies wat op jou ANTWOORDEBOEK verskat word.
2. Beantwoord al die vrae deeglik.
3. Bestudeer alle vrae deeglik.
4. Nommer die antwoorde volgens die nommeringstelsel wat in hierdie vraestel gebruik is.
5. Skryf duidelik en leesbaar.
6. Toon ALLE berekeninge en eenhede.
7. Finale antwoorde moet afgerond word tot TWEË desimale plekke.
8. Kandidate mag nieprogrammeerbare wetenskaplike sakrekenars, asook teken- en wiskundige instrumente gebruik.
9. Die waarde van die gravitasie versnellingskonstante moet as 10 m/s^2 geneem word.
10. Gebruik die onderstaande kriteria om jou te help met die beplanning van jou tyd:

VRAAG	ONDERWERP	PUNTE
1	Meervoudigekeuse-vrae	20
2	Veiligheid	10
3	Gereedskap en toerusting	12
4	Materiale	13
5	Terminologie (Vervaardigingsproses)	30
6	Samevoegingsmetodes	25
7	Kragte	30
8	Instandhouding	15
9	Stelsels en beheer	25
10	Pompe	20
TOTAAL		200

Hierdie vraestel bestaan uit 23 bladsye insluitend 'n formuleblad.



TYD: 3 uur

PUNTE: 200

MEGANIESE TEGNOLOGIE

NOVEMBER 2014

GRAAD 11

**NASIONALE
SENIOR SERTIFIKAAT**