**FITTING AND MACHINING SPECIALISATION 2019**

**GRADE 12 LEARNER SUPPORT**

***EXAMINATION LAYOUT***

The following tables will assist you in the preparation of the upcoming examinations:

June Examination

|  |  |  |
| --- | --- | --- |
| **Content** | **Marks** | **Minutes** |
| Multiple Choice (Generic) | 10 | 8 minutes |
| Multiple Choice (Specific) | 14 | 10 minutes |
| Generic – Safety | 22 | 19 minutes |
| Specific – Terminology (Lathe & Mill) | 20 | 18 minutes |
| Specific – Terminology (Indexing) | 23 | 24 minutes |
| Specific – Tools  | 20 | 18 minutes |
| Specific – Forces | 35 | 31 minutes |
| Specific – Maintenance  | 18 | 15 minutes |
| Specific – Joining Methods | 38 | 37 minutes |
| **TOTAL** | **200** | **180** minutes |

September / November Examination

|  |  |  |
| --- | --- | --- |
| **CONTENT** | **MARKS** | **TIME** |
| **GENERIC** |  |  |
| Multiple-choice questions  | 10 | 6 minutes |
| Safety  | 14 | 10 minutes |
| Materials  | 30 | 14 minutes |
| **SPECIFIC** |  |  |
| Multiple-choice questions  | 14 | 10 minutes |
| Terminology (Lathe and Milling Machine)  | 18 | 20 minutes |
| Terminology (Indexing)  | 28 | 25 minutes |
| Tools and Equipment  | 13 | 10 minutes |
| Forces  | 33 | 25 minutes |
| Maintenance  | 18 | 10 minutes |
| Joining Methods  | 18 | 10 minutes |
| Systems and Control (Drive Systems)  | 28 | 20 minutes |
| **TOTAL** | **200** | **180 minutes** |

***Important content***

**NB!:** The following is not a scope for exams, but guidelines for studying!

Safety and materials is *GENERIC* content that will be asked across all Specialisations.

The mistake learners make is that they intent to try to answer these questions from general knowledge. These sections should be studied just as the same as all other sections across the curriculum.

With the new Specialisation subject, the following must be studied intensely…

1. Derived units:

The following is where learners lose a lot of marks because they do not know the following derived units. It is very important to look at the symbol and know to use it as well if it a capitol letter or lower case letter.

 **SI base units**

|  |  |  |
| --- | --- | --- |
| **Base quantity** | **Name** | **Symbol** |
| Length | metre | m |
| Mass | kilogram | kg |
| Time | second | s |

 **SI derived units**

|  |  |  |
| --- | --- | --- |
| **Derived quantity** | **Measurement** | **Symbol** |
| Area | metre square | m² |
| Volume | cubic metre | m³ |
| Speed, velocity | metre per second | m/s |
| acceleration | metre per second squared | m/s² |
| Force | Newton | N |
| Pressure, Stress | Pascal | Pa |
| Energy, work done | Joule | J |
| Power | Watt | W |

**SI prefixes**

|  |  |  |  |
| --- | --- | --- | --- |
| **Prefix** | **Symbol** | **Factor** | **Multiple SI unit with** |
| kilo | k | 10³ | 1 000 |
| Mega | M | 10⁶ | 1 000 000 |
| Giga | G | 10⁹ | 1 000 000 000 |
| Tera | T | 1012 | 1 000 000 000 000 |

1. Formula mistakes made

The mistakes learners make in calculations is not converting first to the correct units of calculation, especially in the calculation of *Stress* and *Hydraulics*. The units for *area* is not being converted first to metres (divide mm by 1000 to get metre).

Correct manipulation is also common mistakes. The following rules should be remembered:

* Always do the calculations in brackets firsts.
* X = $÷$ + = -

Having the correct units in the final answer is vital and important. NB!! No units or incorrect units will be the result of not achieving your allocated mark for the answer, even if the value is correct. Units in engineering are very important for calculations and therefore the answers must be indicated in the correct unit of measurement.

The ONLY calculation that does not contain any units is *STRAIN.*

In *HYDRAULIC* calculations it is important to understand that the pressure in the system all over will be the same. In cylinder A, B or does not matter how many cylinders there are, the pressure in the pipes or any other linked place, will be the same.

Big mistakes are being made also in *INDEXING*.

Below is an explanation of the index plate and the calculation:

Index Plate:

The Cincinnati Index plate consists of two sides with circles from big too small. Each circle has a number of holes in it whereby the plunger of the index head is dropped to in order to cut a section of a circular piece. The table below show the number of holes for each circle on the index plate. You must remember that the index plate can be removed and turned around and be used, therefore the names of *SIDE 1* and *SIDE 2.* Each of the blocks represents a circle and how many holes is in that particular circle. When calculate indexing, you must remember you can only use what is in the table.

|  |
| --- |
| ***Hole circles*** |
| *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* |

Now the formula is important because you must know why you are using the number 40.

It is because for every 40 turns you turn the crank handle of the dividing head, your chuck with your work piece will make then one full turn.

Below is an explanation of the calculation of indexing:

$Indexing= \frac{40}{N}$ where $\frac{40----number of turns of the crank handle to make a full turn}{N----The number of cuts required to cut a gear teeth or side }$

It is very important when conducting the calculations; you need to know the factors of 40 in order for simplification and multiplication in the calculation:

Factors of 40:….. 2, 4, 5, 8, 10, 20

Example:

Calculate the indexing needed to cut a gear with 88 teeth:

$Indexing= \frac{40}{N}$

$Indexing= \frac{40}{88}$ (substitute “N” with the number required to cut)

* Now use the factors of 40 to simplify the fraction below, and this case it can only be 8, so …

$Indexing= \frac{40}{88} ÷ \frac{8}{8}$ (you must remember; what you do on top, you must do on the bottom)

$Indexing= \frac{5}{11}$ (this is how your answer look like after simplification)

* Now it is very important that you look at the number on the bottom FIRST because you now need to find which circle on the plate you must use, so in which number do 11 divide into without having a rest value? The answer is only the number 66 on Side 2. How many times?...6 times. So you need to multiply 11 by 6 and what you do on the bottom, you must do on top…

$Indexing= \frac{5}{11} × \frac{6}{6}$

 = $\frac{30}{66} $

* Your final answer must then be written as follows;

0 Full turns (*because 88 divided into 40 gives you less than a turn)* and 30 holes (*you are going to moves your plunger every 30 holes)* on 66 hole circle (*the circle which you are going to use)*.

1. Study Methods

It is important that calculations are to be done as much as possible. In order to do so, use previous exam or test papers and just change the values for e.g. if the need in indexing to cut 88 teeth on gear, make 90, or 96, or 100 and so forth. The more you practice these calculations, the better you become in understanding and getting them right.

Below are study methods you can apply not only in Mechanical Technology, but in all your other subjects as well…

**Study Methods That Work**

Studying effectively is not a matter of chance. Educators and psychologists have researched study methods for years. Some of the best studies come from the top universities: Stanford, Indiana, and Chicago where precise experiments with student groups have shed light on the most effective study methods. Students who follow these methods learn more easily, retain material for longer periods of time, and save themselves hours of study time. The ten study methods researchers have found that work are:

**1. Making and Keeping a Study Schedule**

Set aside certain hours of each day for study just as you do for nourishment and sleep. Keep the same schedule faithfully from day-to-day. The amount of time needed for study will vary for each individual based on skills with the subject matter. An average of two hours of study each day for each hour in class is recommended. Going to class is only the beginning; the real work begins afterwards!

**2. Studying in an Appropriate Setting — Same Time, Same Place, Every Day**

If concentration is your problem, then the right surroundings will help you greatly. Your study desk or table should be in a quiet place – free from as many distractions as possible. You will concentrate better when you study in the same place every day. It’s a mind set. For example, when you sit down at the kitchen table, you expect to eat. When you sit down in an easy chair, you watch TV, etc. Developing the habit of studying in the same place at the same time everyday will improve your concentration.

**3. Equipping Your Study Area With All the Materials You Need**

Your study desk or table should be equipped with all the materials you might need to complete the assignment, e.g., pencils, pens, erasers, paper clips, stapler, dictionary, snacks, and liquid refreshments, etc. For some assignments, you may require a calculator or other supplies. With your materials at hand, you can study without interruption. If you have an answering machine, let it do its job during your study time. You can return the calls after you have finished studying. Taking your snack food and drinks to the study location will eliminate those endless trips to the kitchen which break your concentration.

**4. Not Relying on Inspiration for Motivation**

Can you imagine an athlete-in-training waiting for inspiration to strike to practice in preparation for an event? Of course not. They train daily to stay competitive whether they want to or not. Like the athlete, you must get in training for tests and examinations by doing the assignments and preparing daily through review to be ready for the action.

**5. Keeping a Well-Kept Notebook Improves Grades**

Researchers tell us that there is definitely a relationship between orderliness and high grades. Knowing where to find your materials when you need them is crucial. Keep a special section for each subject in your notebook as well as a semester calendar so that you can write down all important assignments as they are announced. Having all of this information together in one place is vital to your success. A well-kept notebook is a part of good time management. If you’ve ever misplaced an important assignment, you know how much valuable time can be lost looking for it.

**6. Keeping a Careful Record of Assignments**

Put it down in black and white—including the details—and keep it in your notebook. Knowing just what you are expected to do and when you are expected to do it is the first giant step toward completing important assignments successfully and on time.

**7. Making Use of “Trade Secrets”**

Flash cards aren’t just for kids! They are a legitimate study tool. Use the front of the card to write an important term, and on the back, write a definition or an important fact about that term. Carry your flash cards with you. Use them during “dead time,” such as standing in a check-out line, waiting in a doctor or dentist’s office, riding a bus, or waiting at the Laundromat. Keep a set in the glove compartment of your car for long lines at your favorite fast food drive-in restaurant or bank. Post them on your bathroom mirror to review while shaving or applying make-up. You’ll be surprised how much you can accomplish during those otherwise “dead times.” Think about developing your own “trade secrets” that will improve your study skills.

**8. Taking Good Notes as Insurance Against Forgetting**

Learn to take good notes efficiently as your instructors stress important points in class and as you study your assignments. Good notes are a “must” for just-before-test-reviewing. Without notes, you will need to reread and review the entire assignment before a test. This may require you to read anywhere from 100-300 pages of material in one sitting. With notes, you can recall the main points in just a fraction of the time. The time you spend in note taking is not lost, but in fact, is a time-saver.

**9. Overlearning Material Enhances Memory**

Psychologists tell us that the secret to learning for future reference is overlearning. Experts suggest that after you can say, “I know this material,” that you should continue to study that material for an additional one-fourth of the original study time. The alphabet is an example of overlearning. How did you learn it? Probably through recitation which is the best way to etch material into the memory trace. Manipulate the material as many different ways as possible by writing, reading, touching, hearing, and saying it. In an experimental study, students who overlearned material retained four times as much after a month than students who didn’t overlearn.

**10. Reviewing Material Frequently**

A student who does not review material can forget 80% of what has been learned in only two weeks! The first review should come very shortly after the material was first presented and studied. Reviewing early acts as a safeguard against forgetting and helps you remember far longer. Frequent reviews throughout the course will bring rewards at test time and will alleviate pre-test anxiety.

Although these ten study methods do work, there is one other component needed when using all of them – taking responsibility for studying by following through on assignments. All the study methods in the world won’t help you if you don’t help yourself. As with most everything in your life, your motto should be, **“I’m responsible for my success!”**

If you put forth the effort to study effectively, the improved skills will soon become a habit and be just as natural as breathing. The result can be better grades, greater knowledge, and higher self-esteem. These skills will also serve you well in your professional and personal life.

(Source: http://www.csc.edu/learningcenter/study/studymethods.csc)

1. Usage of Previous CAPS Examination Papers.

Below is a list of questions you can use as revision from previous CAPS exam papers. You must remember that CAPS Specialisation is new, but there are content that still remain the same from the previous curriculum:

* Question 2 – Safety
* Question 3 – Tools and Equipment
* Question 5 – Terminology
* Question 7 – Forces
* Question 8 – Maintenance
* Question 9 – Systems and Control

These papers can be downloaded from the following website: [www.dbe.gov.za](http://www.dbe.gov.za) and follow the link down that indicates “previous Grade 12 papers” and click and “all previous”. The papers and memorandums can be downloaded.

1. Glossary of keywords in questions.

It became clear in the final examinations Internal Moderators reports that language is problem when it comes to interpret the questions and understanding of questions.

Below is a glossary table in assisting you on how to understand from a question what is required from you:

**GLOSSARY**

INSTRUCTIONAL VERBS AND MEANINGS: INTERPRETING THE QUESTION IN LANGUAGES

Dr Visvaganthie Moodley

Wits School of Education, University of Witwatersrand

|  |  |
| --- | --- |
| Account for | Provide reasons for |
| Analyse | Examine in close detail; identify the issue into its constituent parts/key features. Look in depth at each part using supporting arguments and evidence for and against as well as how these interrelate to each other. |
| Assess | Decide how important/useful/ valuable/ true/ just/ effective something is; make an informed judgement. Identify merits and limitations. Justify your decision. |
| Comment | Present an informed opinion on ... |
| Comment critically | Present an informed opinion; express your judgement/ correctness/ merit of your opinion. Discuss the limitations and good points or contributions of the point in question. |
| Compare | Examine qualities, or characteristics, to discover resemblances/ similarities. 'Compare' is usually stated as 'compare with': you are to emphasize similarities. Although you may not be specifically asked to 'compare and contrast', you may discuss differences. If appropriate, justify your choice. |
| Consider | Think about, review and respond to the given information. |
| Contrast | Stress dissimilarities, differences, or unlikeness of things, qualities, events, or problems. |
| Critically discuss | Express your judgement based On careful consideration of the evidence for and against something Discuss the limitations and merits of something. Always provide supporting evidence from the text. |
| Deduce | Draw conclusion from ... |
| Define | Definitions call for concise, clear, authoritative meanings. Outline the precise meaning of a word or phrase in context. Details are not required but limitations of the definition should be briefly cited. |
| Describe | In a descriptive answer you should recount, characterize, sketch or relate in narrative form. |
| Differentiate between | Identify differences and provide substantiating evidence if appropriate. |
| Discuss | The term discuss, directs you to examine, analyse carefully, and present considerations in favour and against a particular issue/point. This type of question calls for a complete and entailed answer. This is to say, that your response requires you to investigate by argument. You should sift through the arguments and the evidence to support them, giving reasons for and against both sides and examine the implications. This could mean that you might need to provide evidence even for the 'side' you do not support, using evidence from the text. |
| Distinguish | This means to show the difference between things. You must identify differences and provide substantiating evidence if appropriate. |
| Elaborate | Provide a full/complete response. Provide evidence if appropriate. |
| Enumerate | The word enumerate specifies a list or outline form of response. In such questions you should recount, one by one, in concise form, the points required/ the sequence of events and so on. |
| Evaluate | In an evaluation question you are expected to present a careful appraisal/judgement of the problem stressing both merits and limitations. Evaluation implies authoritative appraisal of both merits and limitations. Provide supporting evidence from the text. |
| Examine | Consider in detail; investigate. |
| Explain | In explanatory answers it is imperative that you clarify and interpret the material you present. In such an answer it is best to state the 'how' or 'why', reconcile any differences in opinion, and, where possible, state causes. The aim is to make plain the circumstances which give rise to whatever you are examining. |
| Illustrate | A question which asks you to illustrate usually requires you to explain or clarify your answer to the problem by presenting an example. (In the languages, this does not mean that you should draw something.) |
| Interpret | Reveal what you believe to be the meaning or significance of something; to make sense of something that might otherwise be unclear, or about which there may be more than one opinion. So usually, this involves giving your own judgement. You are expected to translate, exemplify, solve, or comment upon the subject and usually to give your judgement or reaction to the situation/issue. |
| Justify | When you are instructed to justify your answer you must prove or show adequate grounds for a decision or conclusion by supporting it with sufficient evidence and argument. In such a response, evidence must be presented in convincing form. |
| List | listing is similar to enumeration. You are expected in such questions to present an itemized series or tabulation. Such answers should always be given in concise form. |
| Outline | An outline answer is organized description. You should give main points and essential supplementary materials, omitting minor details, and present the information in a systematic arrangement or classification |
| Place in context | State what had just taken place to result in what is happening in the given extract and briefly state what is happening in the given extract? |
| Prove | A question which requires proof is one which demands confirmation or verification. In such discussions you should establish something with certainty by evaluating and citing evidence or by logical reasoning. |
| Relate | This usually means: (i) narrating a sequence of events - outline the story of a particular incident or (li) showing how certain things are connected or affect each other, or to what extent they are alike. In a question which asks you to show the relationship or to relate, your answer should emphasize connections and associations in descriptive form. |
| Review | A review specifies a critical examination. Examine closely an issue/ idea/point/subject that has been put forward for a certain proposal or argument. Usually, although not always, this means concluding with your own judgement as to the strength of the case. |
| State | In questions which direct you to specify, give, state, or present, you are called upon to outline briefly and dearly the facts of the situation or a side of an argument. This doesn't call for argument or discussion, just the presentation of the facts or the arguments. Equally it doesn't call for a judgment from you, just reportage. |
| Summarize | When you are asked to summarise or present a summarisation, you should give in condensed form/concise account of the main points or facts. All details, illustrations, elaboration and argument are to be omitted. |
| Trace | When a question asks you to trace a course of events, you are to give a description of progress, historical sequence, or development from the point of origin. |