

LECTURER: MARTHA DANSO
PROGRAMME: 4-YEAR B.ED. (TECHNOLOGY EDUCATION)
COURSE: MECHANICAL TECHNOLOGY III (MACHINE TOOLS II)
CODE: DTE 364
CREDIT: 3
SEMESTER: 6
LEVEL: 300

OBJECTIVES

The course is aimed at providing the relevant knowledge and skills in:

- Designing and manufacturing components with the use of the shaping and milling machines.
- Selecting the most appropriate tools and accessories for these machine tools.

WEEK	TOPIC	CONTENT / NOTES	ASSIGNMENT DATE OF SUBMISSION
1,2	The shaping machine, tools and accessories.	Describing the machine, the parts and functions of the parts including the ram, the ram head, the work-table, the saddle and the base. Identifying and discussing the functions of the various cutting tools and other accessories like the feeler gauge, dial gauge, dial test indicator and clinometers.	Sketch a two-dimensional view of the shaping machine and label the most essential parts. Sketch and discuss the functions of four of the accessories of the shaping machine described. Week 2 (submission).
4	The driving mechanism.	Discussing how the machine works. Observing how the mechanism works in the workshop.	With the aid of a neatly sketched diagram, discuss the driving mechanism of the shaping machine. Week 5 (submission).
5	Speeds of the shaping machine and mounting of cutters.	Explaining the two main speeds of the shaping machine and calculating the average velocity of the cutting tool. Describing various types of cutting tools and differentiating from the lathe cutter. Discussing how to mount the shaping machine cutter, how to start and stop the machine. Demonstrating how the mounting is carried out at the workshop. Describing the consequence of tool overhang and deflection.	Practice how to fix the cutter, how to put the machine in motion and how to stop it. With the aid of sketches and annotations, differentiate between the two types of shaping machine cutter. Week 5 (submission)
6,7	Techniques of shaping: vertical, horizontal, angular.	Describing through sketches and annotations how the shaping machine is set to shape with the horizontal, vertical and angular cutting techniques.	Sketch the positions of the ram head when employing the three techniques of shaping and give detailed description of each operation Week 7 (submission)
8,9	Milling: Types and parts of the milling machine and cutters.	Discussing the types of the machine, differentiating between them and their cutters. Describing the cutters and mounting them. Explaining safety measures to be observed when mounting the cutters, during milling of components and after milling.	Class quiz on content up to week 7

10,11	Cutting actions and holding of work-pieces for milling.	Discussing the cutting actions through sketches and demonstration on the milling machines. Demonstrating the various methods of holding work-pieces in the machine vice for milling. Explaining the forces that restrain such work-pieces and how the forces could be contracted.	Identify a problem you are keen to solve, write your situation and brief, submit your parts/cutting list and orthographic drawings for collection of materials. Week 12 (submission)
12,13	Plain, face and form milling	Identifying the various cutters for plain, face and form milling. Stating the range of sizes of the cutters for these techniques Describing plain and face milling techniques. Discussing the importance of cutting fluid when milling. Milling components employing plain, face and form milling techniques. Differentiating between form and other milling processes. Cutting slots & key-ways.	Carry on with project work in the workshop.
14,	Angular, straddle and gang milling	Describing angular milling using the angle cutters. Citing examples of components milled with angle cutters. Discussing the advantages and disadvantages of angle millers. Describing straddle and gang techniques of milling. Sketching the two techniques of milling. Differentiating between the two techniques. Discussing the advantages and disadvantages of milling with the two techniques.	Class quiz on content from week 8 to 13 Show straddle and gang milling in a neatly labelled sketch and describe how they function.
15,16	Revision and end of semester examination.	Revising course-work and writing end of – semester examination.	Continue with the practical work and submit.

METHODOLOGY

This course is taught through practical activities and not as abstract theoretical work since the ability to select and use tools for the correct purpose is best learnt through practical application during the making of the artefacts or projects.

MODE OF ASSESSMENT

The Continuous Assessment of 40% is accrued from all the assignments which include the quizzes, out-of lecture room assignments and practical project to be submitted. Failure to take part in these assignments and practical work renders a student ineligible to take the end of semester examination.

REFERENCES

- Love, G. (1980). *The Theory & Practice of Metalwork*, London & Edinburgh, Longman.
- Sackey, J.K.N. & Amoakohene, S.K. (1996). *The Motivate Series – Metalwork Technology*, London & Basingstoke, Macmillan.
- Timings, R.L. (1991). *Mechanical Engineering Craft Theory & Related Subjects: Vol. 1&2*, Singapore, Longman-Singapore.
- Willacy, M.D. (1989). *Craft & Design in Metalwork*, London, Hutchinson.