



PROGRAM : NATIONAL DIPLOMA
ENGINEERING METALLURGY

SUBJECT : MATERIALS TESTING: METALLURGY
III

CODE : MTM 3111

DATE : WINTER SSA EXAMINATION 2014
16 JULY 2014

DURATION : (SESSION 2) 11:30 - 14:30

WEIGHT : 40 : 60

TOTAL MARKS : 100

EXAMINER : MR LG JUGANAN 082011303

MODERATOR : DR DK NYEMBWE 5130

NUMBER OF PAGES : 3 PAGES

INSTRUCTIONS : ONE CALCULATOR ALLOWED PER STUDENT

INSTRUCTIONS TO CANDIDATES:

PLEASE ANSWER ALL THE QUESTIONS.

QUESTION 1

A 4340 steel bar is subjected to a fluctuating axial load that varies from a maximum of 330 kN tension to a minimum of 110 kN compression. Given the following determine the bar diameter to give infinite fatigue life based on a safety factor of 2,5. YS = 1010; UTS = 1090 Fatigue limit = 510

[20]

QUESTION 2

State the relationship between true stress and true strain, how is this used to obtain strain hardening coefficients.

[10]

QUESTION 3

Compare flat rolled product and round test bars for geometrical similitude with respect to tensile testing samples.

[10]

QUESTION 4

The ratio of Ferrite to Pearlite in mild steels directly impact on tensile properties, explain.

[20]

QUESTION 5

With the aid of sketch explain deformation by slip as it occurs in creep.

[10]

QUESTION 6

Write brief notes on the ductile to brittle transformation of steels.

[10]

QUESTION 7

List and briefly explain how you would test for the following:

- 8.1 fine fatigue cracks on a machine housing.(4)
- 8.2 Toe Cracks on a weldment(3)
- 8.3 Pipe in an Aluminium extrusion.(3)

[10]

QUESTION 8

Draw and completely label a 'V1' Block used for calibration in U/T.

[10]

FULL MARKS : 100

