FATIGUE TEST

Aim:

To determine the endurance limit of the given specimen under fatigue or cyclic loading.

Apparatus and specimen required:

1. Fatigue testing machine
2. Specimen for fatigue test
3. Set of weights
4. Scale
5. Vernier caliper
6. Pencil / chalk.

Procedure:

1. Measure the overall (L), gauge length (I_g) and diameter at the middle portion (d) of the given specimen.
2. Mark the centre of the specimen using pencil / chalk and fix the specimen in the machine properly.
3. Place a suitable weight (W) say, 50kg in the weight in the weight – hanger of the machine and release the cam so as to apply the weight / load to the specimen.
4. Measure the distance between centre of the specimen and centre of the weight – hanger (l).
5. Calculate the bending stress, which will develop in the specimen during test using the formula:
   Bending stress, $\sigma = \frac{MY}{I}$

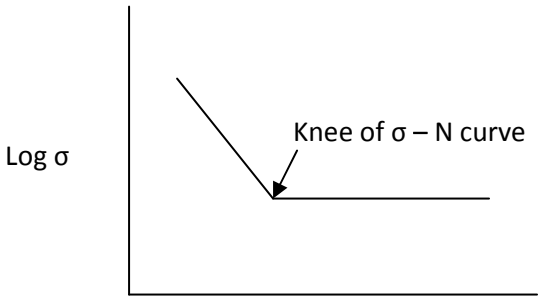
   Where, M = Moment of N mm (= wl)

   I = Moment of inertia in mm^4 ($\pi d4/64$)

   Y = Extreme fibre distance (=d/2)

6. Set the electrical counter of the machine to zero position and start the motor of the machine.
7. Record the number indicated on the electrical counter after the specimen failure.
8. Calculate the actual number of revolutions (N) under gone by the specimen during the test by multiplying the number indicated on the electrical counter with constant of multiplication (i.e. 20) given by the manufacture.
9. Fix another specimen of same material, size and shape in the machine.
10. Repeat the steps from 3 to 8 with 20% decrease in weight at each time.
11. Conduct at least 5 tests for a given material with specimen of same material, size and shape.

12. Plot a graph between log σ Vs log N by taking log σ along Y – axis and log N along x – axis. The shape of the curve will normally be as shown in figure given below.



13. Read the value of stress corresponding to the knee of σ – N curve, which will be the endurance limit stress for the given specimen.

Result:

The endurance limit stress for the given material of the specimen ----------N/mm^2

Observation:

1. Material of the specimen =
2. Over all length of the specimen, L = mm
3. Gauge length of the specimen. l_g = mm
4. Diameter at the middle portion of the specimen, d = mm
5. Distance between centre of the specimen and centre

   Of the weight – hanger, l = mm

Sl.No.	Weight (W) in		Moment (M) In Nmm (w x l)	Bending stress In N/mm^2 ($\sigma = MY / I$)	Indication in the counter (P)	Actual No. of revolutions (N) (p X 20)	Log σ	Log N
	kg	N						