



Hashemite University  
Faculty of Engineering  
Mechanical Engineering Department  
**Strength of Material Lab**

Group #:.....

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Experiment Title: Torsion Test

Experiment date: ...2\11\2020....

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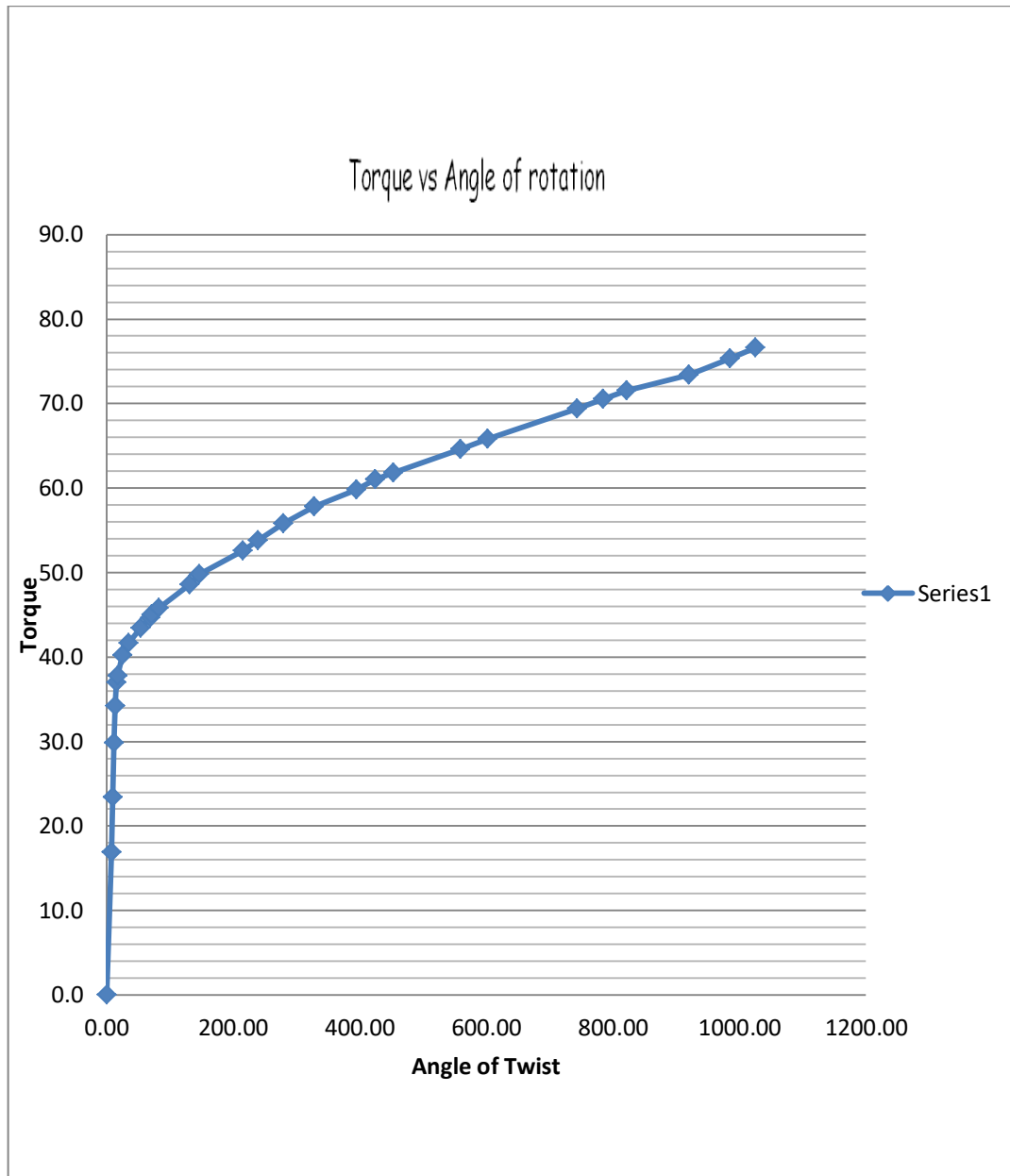
Q#1 from the table below plot torque vs. angle of twist then take five reading for each Region (Elastic & plastic) from the figure then calculate stress & strain:

Dimensions : diameter= 10mm

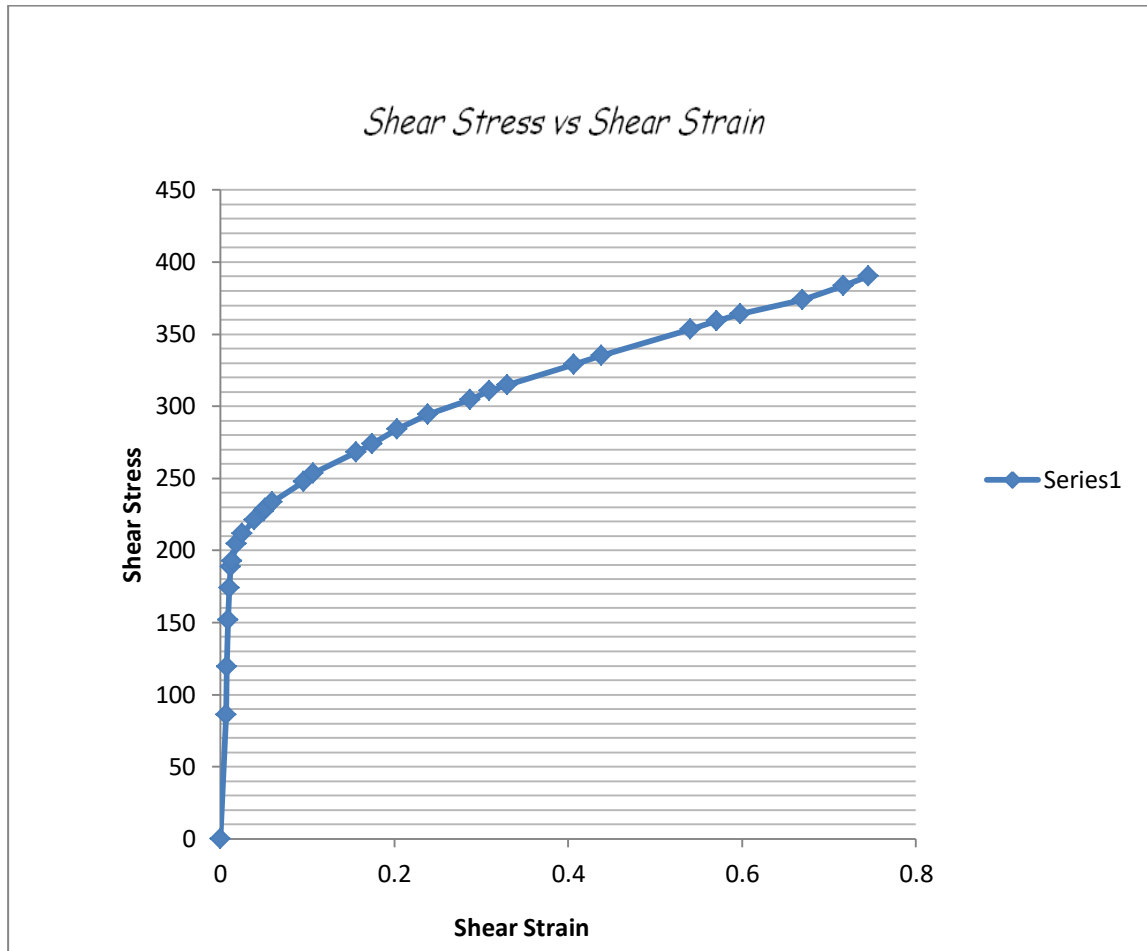
length = 120mm

Torque N.m	$\Phi$ deg	stress (Map) $\tau$	strain $\gamma$
0	0	0	0
16.9	8.5	86.07079195	0.006181374
23.4	10.3	119.1749427	0.007490371
29.8	12.1	151.7697988	0.008799368
34.2	13.7	174.1787624	0.009962921
37	15.6	188.439012	0.01134464
37.8	17.6	192.513369	0.012799081
40.2	25.3	204.73644	0.018398679
41.6	34.6	211.8665648	0.02516183
43.4	53.8	221.0338681	0.039124464
44.6	68.8	227.1454036	0.050032772
45	70.8	229.1825821	0.051487213
45.8	82.2	233.2569391	0.059777527
48.6	131.5	247.5171887	0.095629499
49.8	146.8	253.6287242	0.106755973
52.6	214.9	267.8889738	0.15627969
53.8	239.6	274.0005093	0.174242037
55.8	279.2	284.1864018	0.20303997
57.8	328.3	294.3722944	0.238746497
58.8	394.6	304.5581869	0.286961218
61	424.9	310.6697224	0.308996
61.8	453.2	314.7440794	0.32957634
64.6	558.9	329.004329	0.40644355
65.8	602.3	335.1158645	0.43800492
69.4	743.3	353.4504711	0.540543014
70.5	784.9	359.052712	0.570795388
71.5	822	364.1456583	0.597775269
73.4	920	373.8222562	0.66904288
75.3	985	383.4988541	0.716312214
76.6	1025	390.1196842	0.745401035

Q2#. Plot Torque (N.m) vs. Angle of twist (rad)



Q3#. Plot stress strain diagram



Note: you have to show me one sample of calculation for elastic & plastic region.

Q4#. Determine the following properties:

The proportional limit

204.73 Mpa

Yield strength at an offset 0.1%

253.62 Mpa

Modulus of rigidity

G=13.98 Gpa

Modulus of resilience

102365

Modulus of rupture

193.2 Mpa

The total angle of twist

$\phi = 8.944$

Q5#. Draw the shape of fracture and explain for the two specimens (ductile, brittle).

Ductile: Fracture at angle 90 because the specimen is not pure.

Brittle: Fracture at angle 45 because the specimen is pure (normal state).

