

	Name	:	_____
	ID No.	:	_____
	Group	:	_____
	Section	:	_____
	Submission date	:	_____
Assignment No.	:	2	
Duration	:	1 day	
Total Marks	:	100	

### Answer the following questions

- Iron has a BCC crystal structure with atomic weight of 55.85 g/mol and atomic radius of 0.124 nm.
  - Sketch the unit cell of iron. **(10 Marks)**
  - Calculate the atomic packing factor for this crystal structure. **(20 Marks)**
  - Calculate the theoretical density of Iron, when Avogadro's number is  $6.22 \times 10^{23}$  atoms/mol. **(20 Marks)**
- A cylinder rod with 380 mm in length and 10 mm in diameter is subjected to tensile load. This rod should not experience plastic deformation nor elongation of more than 0.9 mm when it subjected to tensile load of 24,500 N. Determine the possible candidate from the four metals or alloys listed in the **Table Q1** and justify your choice(s) **(40 Marks)**
- Hardness tests are performed more frequently than any other mechanical testing due to several reasons. Describe **three (3)** main reasons or benefits of hardness test than other mechanical testing. **(10 Marks)**

**Table Q3**

<b>Materials</b>	<b>Modulus of Elasticity (GPa)</b>	<b>Yield Strength (MPa)</b>	<b>Tensile Strength (MPa)</b>
Aluminum alloy	70	255	420
Brass alloy	100	345	420
Copper	110	250	290
Steel alloy	207	450	550