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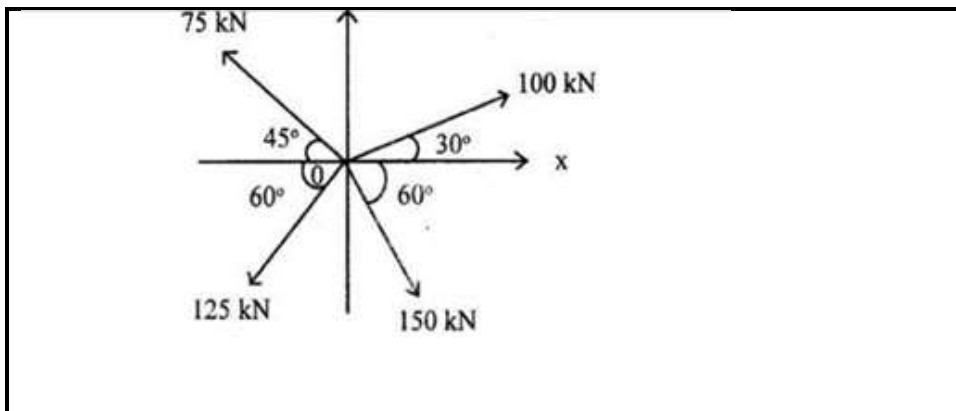
**DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)**

**HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET**

|                |                               |                        |               |                       |           |
|----------------|-------------------------------|------------------------|---------------|-----------------------|-----------|
| <b>SUBJECT</b> | FITTING & MACHINING           | <b>GRADE</b>           | 12            | <b>DATE</b>           | JUNE 2020 |
| <b>TOPIC</b>   | FORCES & MAINTENANCE SPECIFIC | <b>TERM 1 REVISION</b> | (Please tick) | <b>TERM 2 CONTENT</b> | (✓)       |

**QUESTION 1**

**1.1 Resultant Force Calculations:**



**Figure 1.1**

$$X_{com} = 100 \cos 30 + 150 \cos 60 - 125 \cos 60 - 75 \cos 45 \quad \checkmark\checkmark$$

$$= 152,135 \text{ N} \quad \checkmark$$

$$Y_{com} = 100 \sin 30 + 75 \sin 45 - 125 \sin 60 - 150 \sin 60 \quad \checkmark\checkmark$$

$$= 124,683 \text{ N} \quad \checkmark$$

$$R = \sqrt{X^2 + Y^2} \quad \checkmark$$

$$R = 196,7 \text{ N} \quad \checkmark$$

$$\tan \theta = y/x \quad \checkmark$$

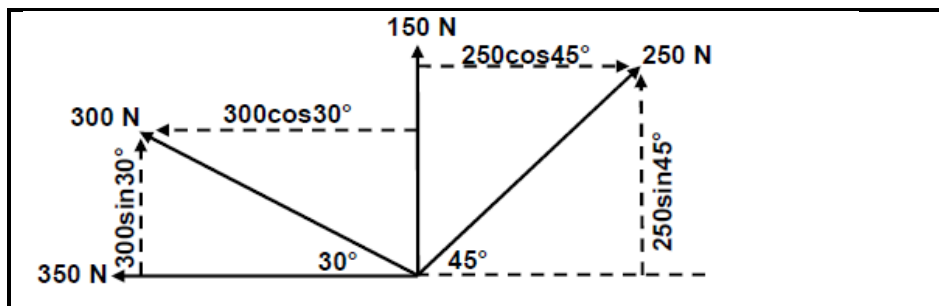
$$\theta = 124,683/152,135 \quad \checkmark$$

$$\theta = 39,336^\circ \quad \checkmark$$

**Equilibrant = Resultant BUT IN THE OPPOSITE DIRECTION** ✓

$$\text{Equilibrant} = 196,7 \text{ N at } 219,336^\circ \quad \checkmark\checkmark$$

## 1.2 FORCES





## **2.2 Reasons for using cutting fluid when working on the centre lathe:**

- It prolongs the life of a cutting tool.
- It prevents the shavings or metal chips from sticking and fusing to the cutting tool.
- It will carry away the heat generated by the turning process.
- It flushes away shavings/metal chips.
- It improves the quality of the finish of the turned surface.

(ANY 1)

## **2.3 Factors that influence the coefficient of friction:**

- Contact pressure
- Surface roughness
- Temperature
- Sliding velocity
- Type of lubrication

(ANY 3)

## **2.4 Reasons for using carbon fibre:**

- It light in weight
- It is tougher and stronger
- It can be bent to any shape when heated above 150 °C. (ANY 2)

2.5 ONE property and ONE use of each composites:

|       | Composite | Property  | Uses   |
|-------|-----------|---|--|
| 2.5.1 | Vesconite | - wear resistance<br>- very versatile<br>- high load bearing strength<br>- high chemical resistance<br>- Very low co-efficient of friction<br>(Any 1) | - Discs<br>- Thrust washers<br>- Wear pads<br>- Vanes<br>- Light duty gears<br>(Any 1) |
| 2.5.2 | Teflon    | - Withstands high temperatures<br>- self-lubrication<br>- resistant to water, grease heat and corrosion.<br>(Any 1)                                   | - Orthopaedic and prosthetic appliances.<br>- Hearing aid<br>- upholstery<br>(Any 1)   |
| 2.5.3 | Nylon     | - toughness, hard-wearing, cheap, needs little maintenance<br>(1)   | - Bushes<br>- gears<br>- Pulleys<br>(1)  |

2.6 Consequences for failure to do maintenance:

- Risk of injury or death (e.g. Failed brakes)
- Financial loss due to damage suffered as a result of part failure
- Loss of valuable production time.

**QUESTION 3 MAINTENANCE**

3.1 Preventative maintenance:

- To prevent injury or death (e.g. Brake failure)
- To prevent financial loss due to damage suffered as a result of part failure.
- To prevent loss of production time. (ANY 2)

3.2 Preventative maintenance procedures on gear drive systems:

- Check and replenish lubrication levels.
- Ensure that the gears are properly secured to the shafts.
- Clean and replace oil filters.
- Report excessive noise and wear, vibration and overheating for expert attention. (ANY 2)

### 3.3 Causes for the malfunctioning of belt drive systems:

- Incorrect belt tension.
- Misalignment of the pulleys.
- Dirt on the contact surfaces between the belt and the pulley.
- Lubricant on the contact surfaces between the belt and the pulley.
- Overloading the drive system. (ANY 2)

### 3.4 Procedures to reduce the wear on a chain drive system:

- Ensure sufficient lubrication.
- Accurate alignment of the sprockets.
- Keep the chain drive components clean.
- Maintain the correct chain tension in the system. (ANY 2)

### 3.5 Properties of materials:

#### 3.5.1 Fibre glass:

- High strength
- Light weight
- Water resistant
- UV-resistant. (ANY 2)

#### 3.5.2 Vesconite:

- Low friction.

- Easily machined.
- High load carrying capacity.
- Self-lubricating.
- Cost-effective.
- Performs well in unhygienic, dirty and un-lubricated environments.
- Ensures long life together with low maintenance. (ANY 2)

### 3.5.3 Carbon fibre:

- High strength
- Light weight
- Water resistant
- UV-resistant
- Self-lubricating (ANY 2)

### 3.6 'Thermoplastic' composites or 'Thermo hardened' (thermosetting)

composites:

#### 3.6.1 **Teflon:**

Thermoplastic

#### 3.6.2 **Bakelite:**

Thermo hardened

#### 3.6.3 **Polyvinyl chloride (PVC):**

Thermoplastic

### 3.7 **Higher coefficient of friction:**

Rubber