

## Machine Element ( 3<sup>rd</sup> Year Production)

**A Small-sized Wind Turbine** is schematically shown in Fig (a), and is delivering a maximum rated power of (**XX KW**). This Wind Turbine is using “**A Single-Stage- Spur- gearbox**” to speed up the main Drive shaft speed from **20** rpm to **NN** rpm (see Fig (b)).

In order to absorb shock loads , such gear box is suspended in space by **two** torque arms –as shown in Fig ( c ); which is attached to the turbine housing by a Bolted Joint, of **KK** equally spaced Hexagonal bolts.

**Write down a Research paper FOR such a Case Study, in accordance to the Given Research Template**

(Your Introduction must be a brief about Wind Turbine, Usage, Main Components and main working Principle).

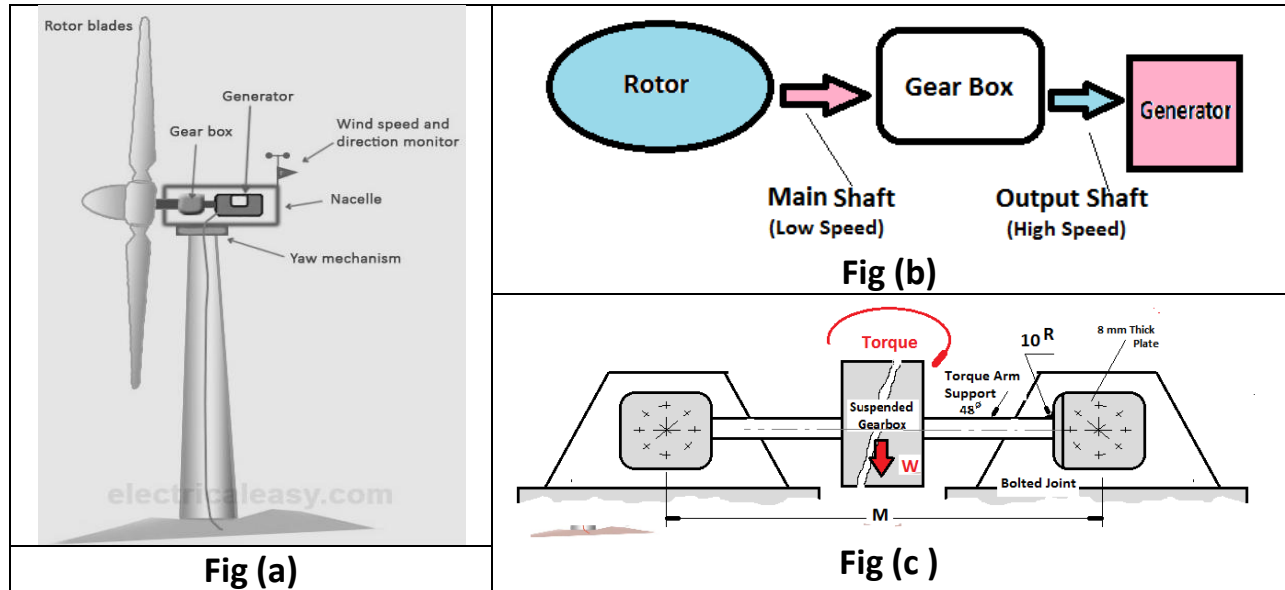
It is **expected** to address the following:

- 1- The Standard **Design Procedure**,
- 2- Design of **Torque arm**,
- 3- Design of the **Bolted Joint**,
- 4- Design of the used **Spur gear Pair**,
- 5- Design of main Input **Shaft** together with its **KEY**,
- 6- Select the Right **Deep Groove Ball bearings**; which are supporting the main input Shaft, and Finally
- 7- The **Configuration of the Main Input Shaft** (Product Concept, DFM, DFA, Dimensions, Fits, and Tolerances for mating parts)

**P. S.**

DO your own work on your own effort will get you PASS this course, Otherwise (Coping from others or internet ) will make YOU RE-attend this 2-Term course .

*Best Wished*



For **YOUR** specific Research (**Case Study**) Select ONE ROW of the following data

( In accordance to YOUR Arabic FIRST letter (أول حرف من اسمك الاول) )

1 <sup>st</sup> Letter in your Arabic Name	XX	NN	KK	W	E
د - ج - ح - خ - هـ	100 KW	1000 rpm	4 Bolts	10 KN	800 mm
ع - غ - ف - ق - ث	40 KW	1200 rpm	6 Bolts	12 KN	600 mm
ص - ض - ك - م - ط	80 KW	1500 rpm	8 Bolts	15 KN	780 mm
ن - ت - أ - ل - ب	<b>50 KW</b>	<b>1400 rpm</b>	<b>6 Bolts</b>	<b>20 KN</b>	<b>400 mm</b>
ي - س - ش - ظ - ز	70 KW	780 rpm	4 Bolts	24 KN	460 mm
و - ر - ذ	660 KW	1450 rpm	8 Bolts	18 KN	500 mm