EXPERIMENT NUMBER: 1

**TITLE:** Performance test of Diesel Engine using rope brake dynamometer under variable load condition

**OBJECTIVE:** To carry out performance test of single cylinder diesel engine with the the help of rope brake dynamometer and to draw the following graphs

* brake power versus specific fuel consumption
* brake power versus brake thermal efficiency

**SETUP:** Preparation of the engine consists of checking of cooling water line, lubrication line and fuel reserve necessary for completion of the experiment. Engine used is a single cylinder, water cooled, vertically mounted with rope brake dynamometer and is of the following specification

* Rated Power-6HP (4.5 KW) at 600RPM
* Diameter of piston-114 mm
* Length of stroke: 140 mm
* Diameter of rope(d)=16mm
* Diameter of brake wheel(D) = 60 cm
* Mean radius of wheel and rope= (D+d)/2=308 mm
* Calorific value of fuel – 41800 KJ/kg
* Weight of 35cc of fuel- 28.8 gm

**THEORY:**

**BRAKE POWER:**Brake power of an engine is the useful power which is obtained at the output shaft. It is measured by a dynamometer using a brake attached to the engine’s drive shift.

Brake Power = [Indicated Power]- [Lasses] of Engine

Mathematically,

**BRAKE THERMAL EFFICIENCY:** Ratio of the heat equivalent of brake power output to the heat supplied to the engine.

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**BRAKE SPECIFIC FUEL CONSUMPTION**: It literally means the amount of fuel which is consumed by engine in one hour to produce 1 kw brake power.

The unit of BSFC is gram per joule(g/J)

**CALCULATIONS:**

FOR RUN NO 2

**OBSERVATIONS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Roll No: | 1 | 2 | 3 | 4 |
| Break Load ( | 0 | 4.6 | 9.4 | 14.7 |
| RPM | 600 | 600 | 600 | 600 |
| Spring Balance Reading(s) | 0 | 0.7 | 1.3 | 2.4 |
| Time for 35cc fuel consumption | 389 | 255 | 197 | 155 |
| Net Load | 0 | 3.9 | 8.1 | 12.3 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No | Break Load ( | Spring Balance Load(s) | Time for 35cc fuel consumption(sec) | Brake Power (HP) | Fuel Power (HP) | Break Thermal Efficiency | Specific Consumption(kg/kgf) |
| 1 | 0.0 | 0.0 | 389 | 0 | 4.15 | 0 | ∞ |
| 2 | 4.6 | 0.7 | 255 | 1.01 | 6.33 | 15.96 | 0.5396 |
| 3 | 9.4 | 1.3 | 197 | 2.09 | 8.19 | 25.52 | 0.3376 |
| 4 | 14.7 | 2.4 | 155 | 3.17 | 10.41 | 30.45 | 0.2828 |

**CONCLUSION:** In this experiment we studied about the performance of the diesel engine using rope brake dynamometer under variable load condition. In the experiment when we plot a graph between the brake power and brake thermal efficiency then with increase in the break power brake thermal efficiency is also increased slowly and when we plot brake power versus specific fuel consumption then with increase in break power specific fuel consumption decreases.