



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan  
Pendidikan Berterusan  
(UTMSPACE)

5

**FINAL EXAMINATION / PEPERIKSAAN AKHIR  
SEMESTER 1 – SESSION 2016 / 2017  
PROGRAM KERJASAMA**

COURSE CODE : DDPJ 2312 / DDJ 3312 / DDPJ 3322  
KOD KURSUS

COURSE NAME : FLUID POWER /  
NAMA KURSUS : KUASA BENDALIR

YEAR / PROGRAMME : 2 / DDPJ / DDPB  
TAHUN / PROGRAM

DURATION : 2 HOURS / 2 JAM  
TEMPOH

DATE : OCTOBER 2016  
TARIKH

**INSTRUCTION/ARAHAN :**

1. Answer **ALL** question in the answer booklet (s) provided.  
*Jawab semua soalan di dalam buku jawapan yang disediakan.*
2. Candidates are required to follow all instructions given out by the examination invigilators.  
*Calon dikehendaki mematuhi semua arahan daripada penyelia peperiksaan.*

( You are required to write your name and your lecturer's name on your answer script )  
( Pelajar dikehendaki tuliskan nama dan nama pensyarah pada skrip jawapan )

NAME / NAMA	:	.....
I.C NO. / NO. K/PENGENALAN	:	.....
YEAR / COURSE TAHUN / KURSUS	:	.....
COLLEGE NAME NAMA KOLEJ	:	.....
LECTURER'S NAME NAMA PENSYARAH	:	.....

This examination paper consists of ...7... pages including the cover  
*Kertas soalan ini mengandungi .....7..... muka surat termasuk kulit hadapan*

Q1. Fluid power system in **Figure Q1**, the mechanical energy is delivered to the pump via a prime mover. Pump has a rotor diameter of 50 mm, a cam ring diameter of 80 mm, a vane width of 60 mm and eccentricity is 10 mm. Steel tube is SAE 1010 dead soft cold drawn and operating pressure of 70 bar. The total pressure drop in the line from the pump discharge port to the blank end of the cylinder is 5.2 bar. The total pressure drop in the return line from the rod end of the cylinder is 3.4 bar. External dynamic load exerted on cylinders is 178 kN. Extending speed of cylinder is 76.2 mm/s. Cylinder stroke is 0.6 m and assume  $L=1$ . Pump mechanical efficiency is 87%. Pump speed is 1300 rpm. An electric motor having an overall efficiency of 85% drives the pump. The hydraulic system operates 12 hours per day for 250 days per year. The cost of electricity is RM 0.12 per kilowatt-hour. Determine the

- a. Proper size of double acting cylinder.
- b. Volumetric displacement of the pump.
- c. Pump volumetric efficiency.
- d. Proper metric size steel tube.
- e. Input power required to drive the pump.
- f. Percentage of pump input power delivered to the load.
- g. Yearly cost of electricity to operate the hydraulic pump.
- h. Amount of the yearly cost of electricity that is due to the inefficiencies of the electric motor and pump.

*Sistem kuasa bendalir di tunjukkan di dalam **Rajah Q1**, tenaga mekanikal dibekalkan kepada pam oleh penggerak utama. Pam mempunyai diameter rotor 50 mm, diameter gelang sesondol 80 mm, lebar bilah 60 mm dan kesipian 10 mm. Tiub keluli dari jenis SAE 1010 'dead soft cold drawn' dan*

- c. Kecekapan isipadu pam.
- d. Saiz tiub keluli.
- e. Kuasa masukan untuk memacu pam.
- f. Peratus kuasa masukan pam yang di hantar kepada beban.
- g. Kos tenaga elektrik untuk operasi pam hidraulik setahun.
- h. Jumlah kos elektrik tahunan yang disebabkan oleh ketidak cekapan pam dan motor elektrik.

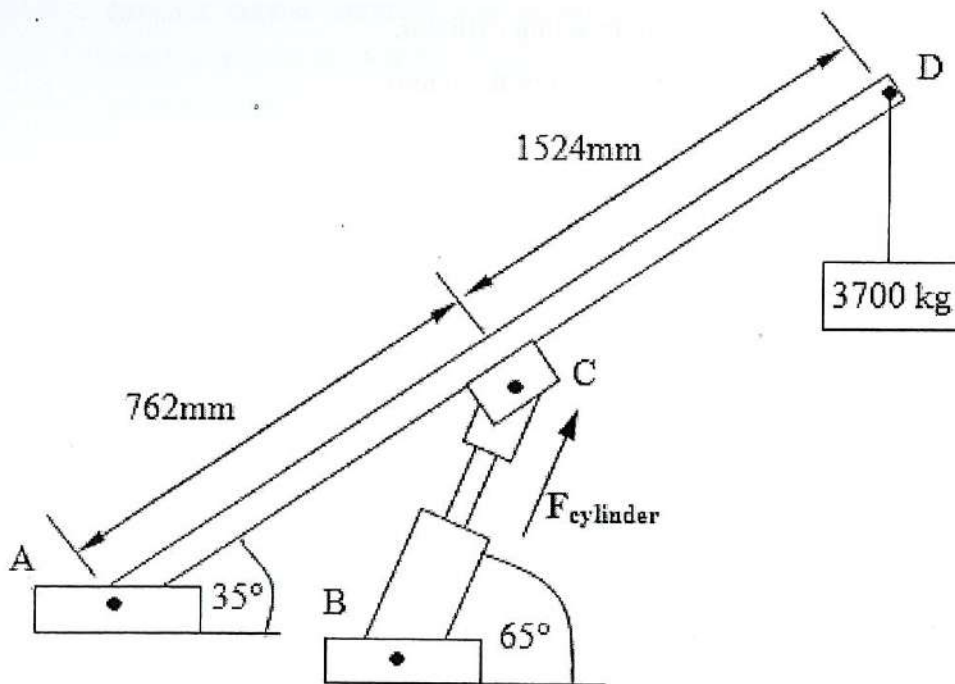
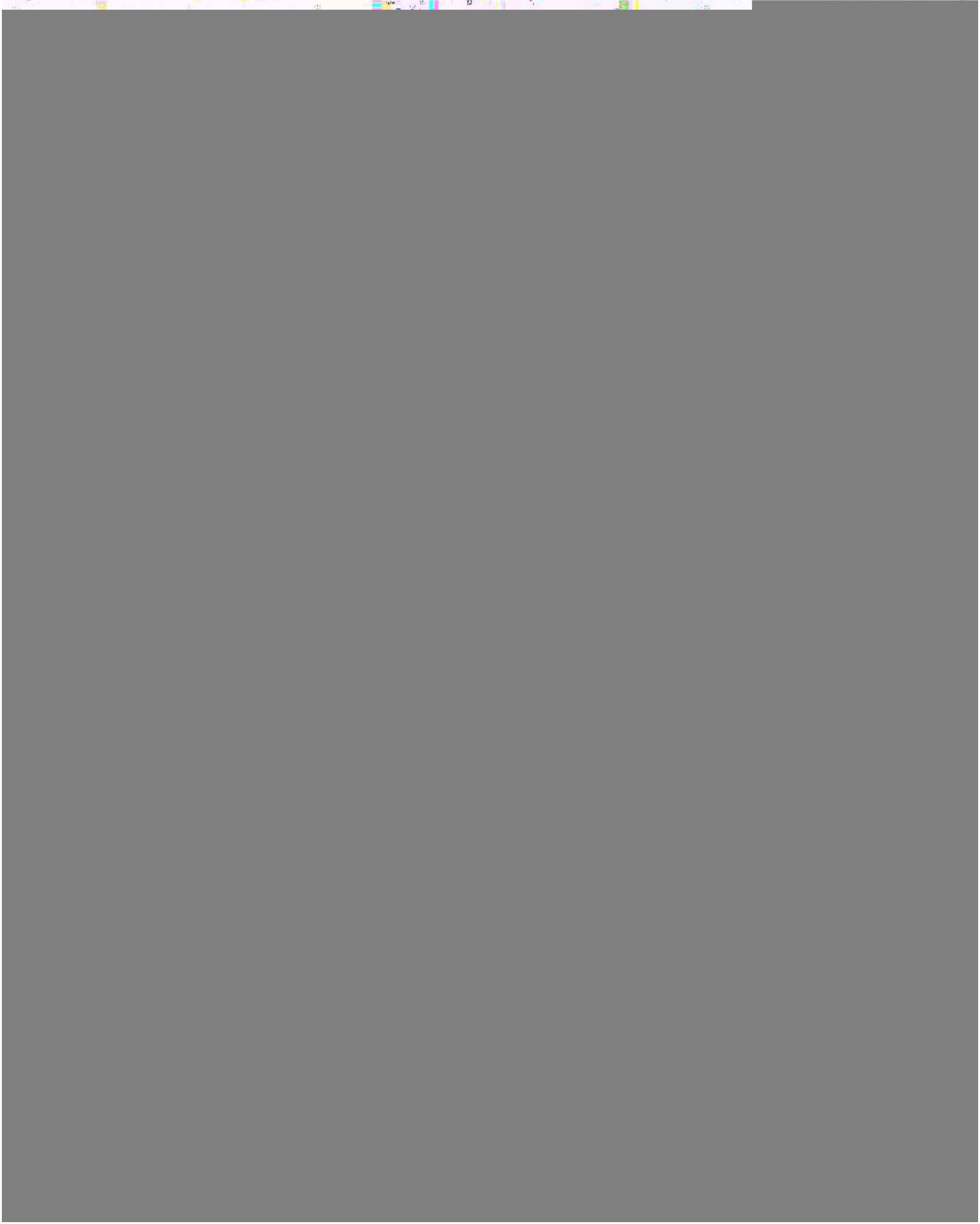
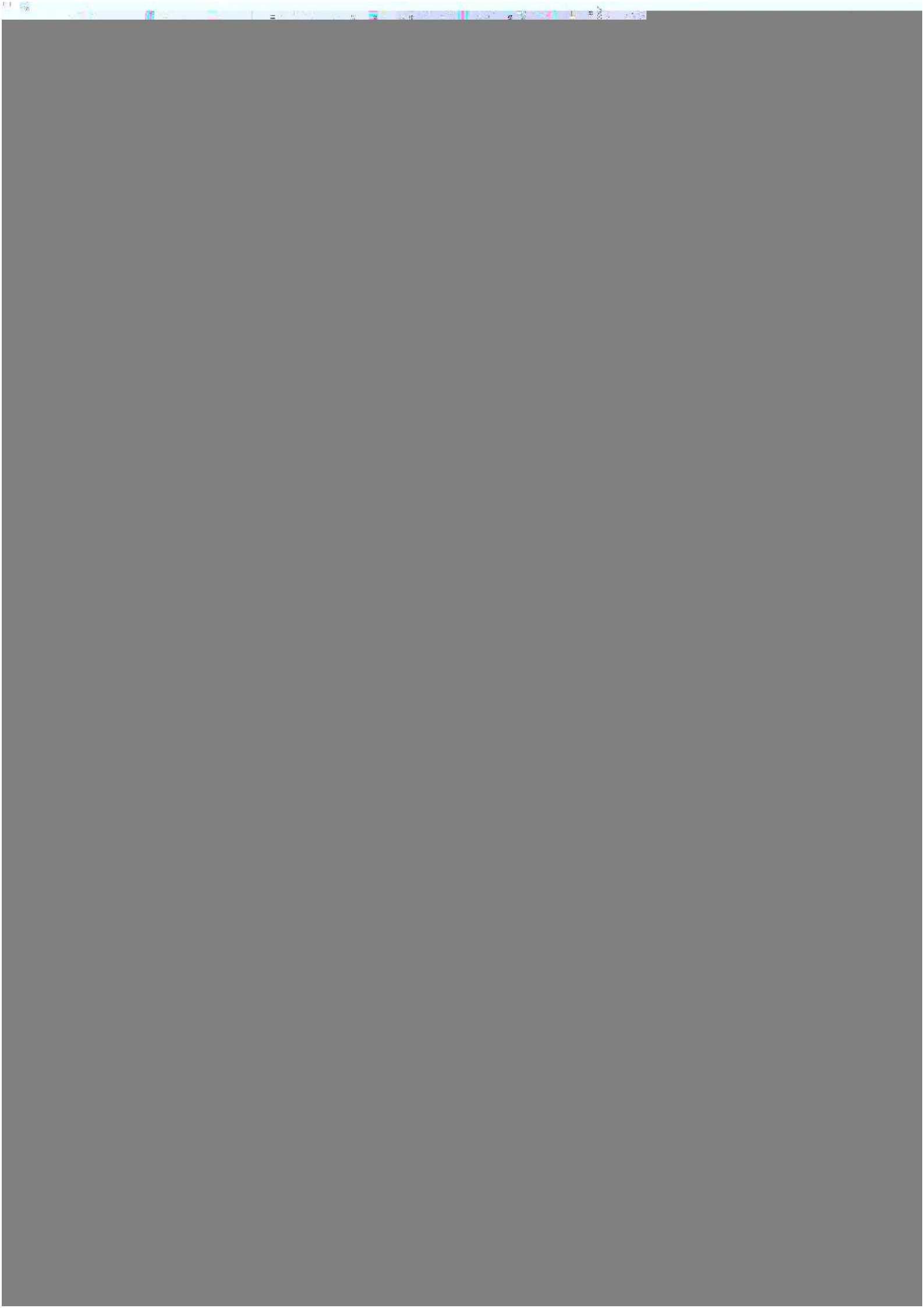


Figure Q1 / Rajah Q1

(25 marks / markah)





**APPENDIX**

**Table 1 Common cylinder size**

Garis pusat ombok (mm)		40	50	63	80	100	125	140	160	180	200	220	250	280	320
Garis pusat rod (mm)	Kecil	20	28	36	45	56	70	90	100	110	125	140	160	180	200
	Besar	28	35	45	56	70	90	100	110	125	140	160	180	200	220