PART - D EXP: 1 (a)

S. No.	Temperature of oil in °C	Observation
1.	36°C	No change.
2.	56°C	No change.
3.	86°C	No change.
4.	106°C	No change.
5.	126°C	No change.
6.	156°C	No change.
7.	186°C	No change.
8.	190°C	No change.
9.	210°C	Flash Point
10	240°C	Fire Point.

PART-A EXP:-1(b)

Observation and Tabulation:-

S No.	Temperature of oil °C	Observation
1.	36°C	No change.
2.	40°C	No change.
3.	66°C	No change.
4.	86°C	No change.
5.	106°C	No change.
6.	126°C	No change
7.	156°C	No change.
8.	160°C	No change.
9.	170°C	~~No change.~~ Flash Point
10.	210°C	Fire Point ~~No change~~

PART-A EXP: 2

Observation and Tabulation:-

1) Room temperature T_R = 35°C
2) Density of oil at room temperature 0.85 gm/cm²

S. No.	Temperature of oil °C.	Time taken of fill 50ml flask in 'sec'	Kinematic viscosity in 'centi stokes'	Desity of oil gm/cm²	Dynamic (or) Absolute viscosity in "centi Poise"
1.	45°	450	116.618	98.367	0.843.
2.	55°	370	95.436	80.131	0.837.
3.	65°	310	80.046	66.478	0.830.

Model calculation:-

1. Kinematic viscosity KV = (At - B/t) centistokes.

where A = 0.26, B = 172 } constant.

t = Time taken in seconds.

2. Absolute viscosity = (KV x density) poise/NS/m².

where desity of oil at room temperature is 0.84 (or) 0.85 gm/cm³.

PART-A. EXP: 2

Density of oil $\rho_t = \rho_r - 0.00065\,(T - T_r)$.

1. Kinematic viscosity $KV = (At - B/t)$ centi stokes

i) $KV = ((0.26 \times 450) - 172/450)$.
$= 117 - 0.382$.
$= 116.618$ centi stokes

ii) $KV = ((0.26 \times 370) - 172/370)$
$= 96.2 - 0.464$
$= 95.736$ centi stokes

iii) $KV = ((0.26 \times 310) - 172/310)$.
$= 80.6 - 0.554$.
$= 80.046$ centi stokes

ii) Density of oil $\rho_t = \rho_r - 0.00065\,(T - T_r)$.

i) $\rho_t = 0.85 - 0.00065\,(45 - 35)$.
$= 0.85 - (6.5 \times 10^{-3})$.
$= 0.8435$ gm/cm^3

ii) $\rho_t = 0.85 - 0.00065\,(55 - 35)$.
$= 0.85 - 0.013$.
$= 0.837$ gm/cm^3

iii) $\rho_t = 0.85 - 0.00065\,(65 - 35)$.
$= 0.85 - 0.0195$
$= 0.8305$ gm/cm^3.

PART - A EXP. 2

iii) Absolute viscosity = KV x density.

i) = KV x density
= 116.618 x 0.8435
= 98.3672 Poise

ii) = 95.736 x 0.837
= 80.1310 centi Poise.

iii) = 80.046 x 0.8305.
= 66.4782 centi Poise.

Observation and Tabulation:-

1) Room temperature T_R = 35°C
2) Density of oil at room temperature = 0.85 gm/cm

S. No.	Temperature of oil °c.	Time taken to fil 60°cc of oil 'sec'	Kinematic viscosity in 'cent stokes'	Desity of oil	Dynamic (or) Absolute viscosity centipoise
1.	50°c	320	71.711	0.840	60.237
2.	60°c	275	61.441	0.833	51.180
3.	70°c	245	54.575	0.827	45.133.

Model calculation:-

1. Kinematic viscosity KV = (At - B/t) centi stokes.
   where A = 0.226 and B = 195 upto 38°c.
   A = 0.226 and B = 135 above 38°c.
   t = Time taken fill the flask in seconds.
2. Absolute viscosity = (Kinematic viscosity x density). Poise (or) NS/m^2
3. Density of oil e_t = e_r - 0.00065 - (T - T_R)

PART-A EXP: 3

i) Kinematic viscosity $KV = (At - B/t)$ centi stokes.

i) $KV = (0.226 \times 320) - (195/320)$.
$= 72.32 - 0.609$.
$= 71.711$ centi stokes.

ii) $KV = (0.226 \times 275) - (195 \cdot 275)$.
$= 62.15 - 0.709$.
$= 61.441$ centi stokes.

iii) $KV = (0.226 \times 245) - (195/245)$.
$= 55.37 - 0.795$.
$= 54.575$ centi stokes.

ii) Density of oil $\rho_t = \rho_r - 0.00065 (T - T_R)$.

i) $\rho_t = 0.85 - 0.00065 (50 - 35)$.
$= 0.85 - 9.75 \times 10^{-3}$
$= 0.840$ gm/cm^3

ii) $\rho_t = 0.85 - 0.00065 (60 - 35)$
$= 0.85 - 0.01625$
$= 0.833$ gm/cm^3.

iii) $\rho_t = 0.85 - 0.00065 (70 - 35)$.
$= (0.85 - 0.02275)$.
$= 0.827$ gm/cm^3

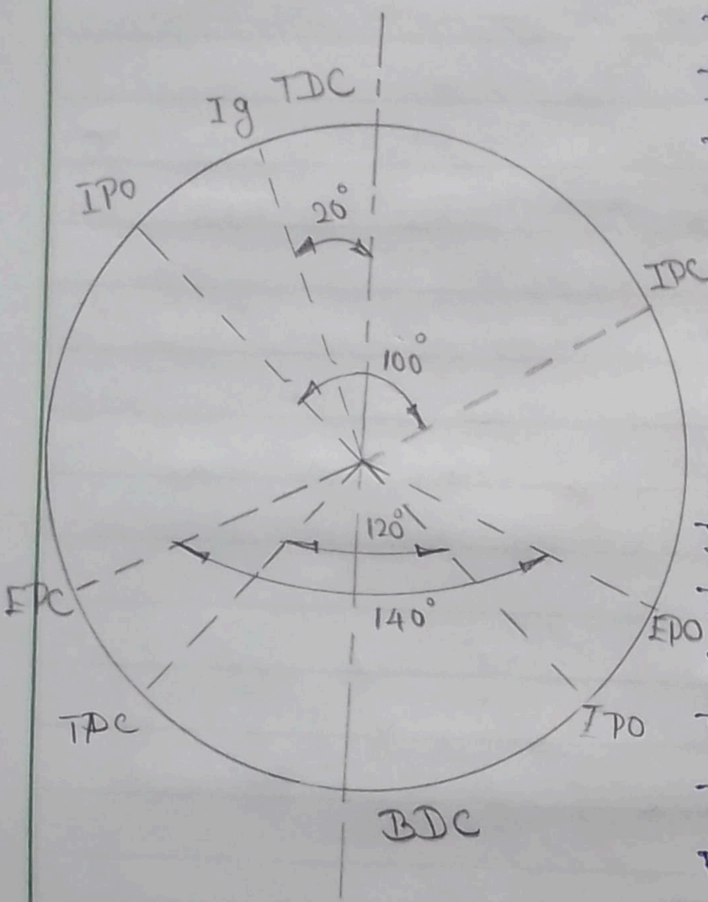
3) Absolute viscosity = Kv x density.

i) = Kv x density
= 71.711 x 0.840
= 60.237 centi poise.

ii) = Kv x density
= 61.441 x 0.833
= 51.180 centi poise.

iii) = Kv x density
= 54.575 x 0.827
= 45.133 centi poise.

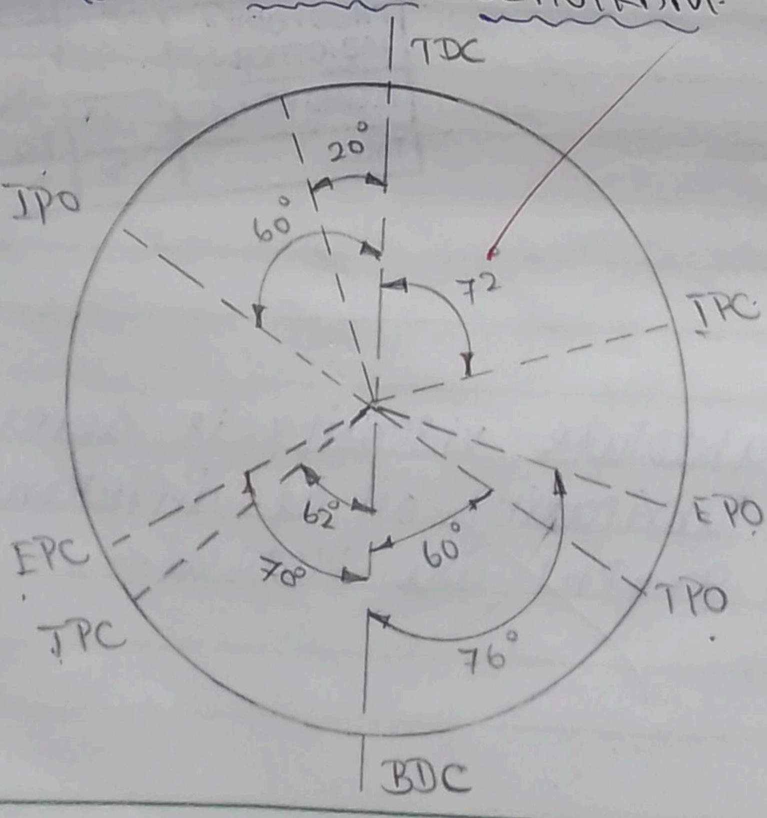
THEORETICAL PORT TIMING DIAGRAM OF 2 STROKE PETROL ENGINE.



IPO - Inlet Port opens.
IPC - Inlet Port close.
TPO - Transfer Port open.
TPC - Transfer Port Closes.
Ig - Ignition.
EPO - Exhaust port opens.
EPC - Exhaust port close.

IPO - IPC : Suction.
IPO - TPO : Crankcase compression
TPO - TPC : Transfer.
TPC - Ig : Compression.
Ig - TPO : Expansion.
EPO - EPC : Exhaust.

PORT TIMING DIAGRAM.



observation and Tabulation :-

i) circumference of fly wheel = 490 mm.
ii) circumference distance in degree 360°.

S. No.	Event	Before (or) After	Timing in	
			Distance in mm (x)	Angle in Degree
1.	TPO	Before BDC.	82 mm	60°
2.	TPC	After BDC.	85 mm	62°
3.	EPO	Before BDC.	104 mm	76°
4.	EPC	After BDC	[illegible]5 mm	70°
5.	IPO	Before TDC.	83 mm	60°
6.	IPC	After TDC.	98 mm	72°.

Model calculation:-

Angle of opening / closing of valve with repect to TDC (or) BDC $= \frac{360°}{\text{circumference of fly wheel}} \times$ distance measured from TDC (or) BDC.

i) $TPO = \frac{360° \times 82}{490}$
$= 60°$

(ii) $TPC = \frac{360}{490} \times 85$
$= 62°$.

PART-A EXP: 4

iii) $EPO = \frac{360^\circ}{490} \times 104$

$= 76^\circ$.

iv) $EPC = \frac{360^\circ}{490} \times 95$

$= 70^\circ$.

v) $IPO = \frac{360^\circ}{490} \times 83$

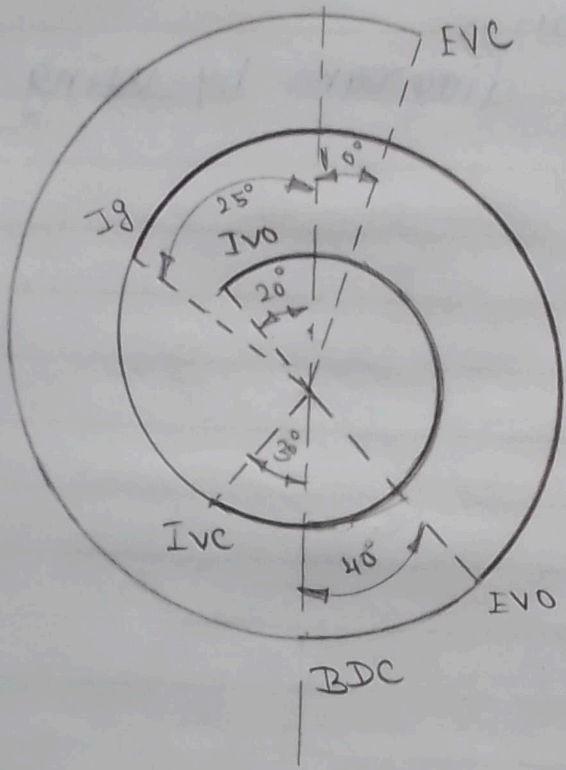
$= 60^\circ$.

vi) $IPC = \frac{360^\circ}{490} \times 98$

$= 72^\circ$

PART-A EXP 5

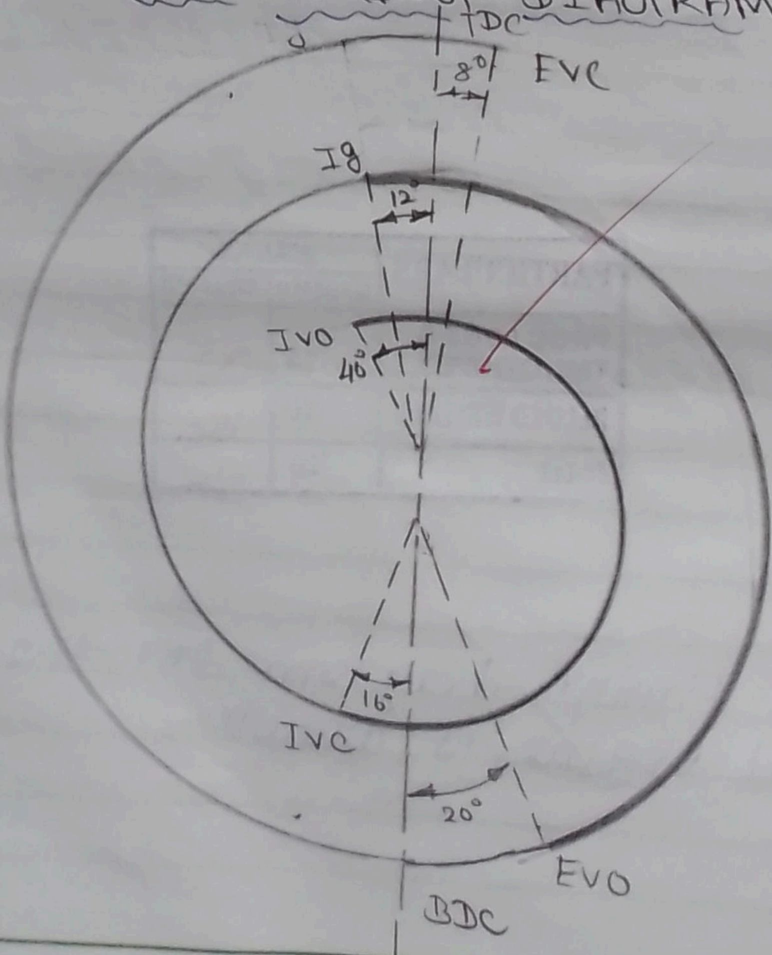
THEORETICAL VALVE TIMING DIAGRAM OF 4 STROKE PETROL ENGINE.



IVO - Inlet valve open
IVC - Inlet valve close.
Ig - Ingnition.
EVO - Exhaust valve open.
EVC - Exhaust valve closes.

IVO - IVC : suction.
IVC - Ig : compression.
Ig - EVO : Expansion.
EVO - EVC : Exhaust.
IVO - EVC : valve over lap.

PORT TIMING DIAGRAM.



PART-A EXP:5

Observation and Tabulation:-

Circumference of fly wheel = 450 mm = 360°

S. No.	Event	Before (or) After	Timing in	
			Distance in mm	Angle in Degree
1.	IVO	Before TDC	50	40°
2.	IVC	After BDC	20	16°
3.	EVO	Befor BDC	25	20°
4.	EVC	After TDC	10	8°
5.	Ignition	Before TDC	15	12°

Model calculation:-

Angle of opening / closing of valve with respect to TDC (or) BDC $= \frac{360}{\text{circumference of flywheel}} \times$ distance from BDC (or) TDC

i) IVO $= \frac{360}{450} \times 50 = 40°$

ii) IVC $= \frac{360}{450} \times 20 = 16°$

iii) EVO $= \frac{360}{450} \times 25 = 20°$

iv) EVC $= \frac{360}{450} \times 10 = 8°$

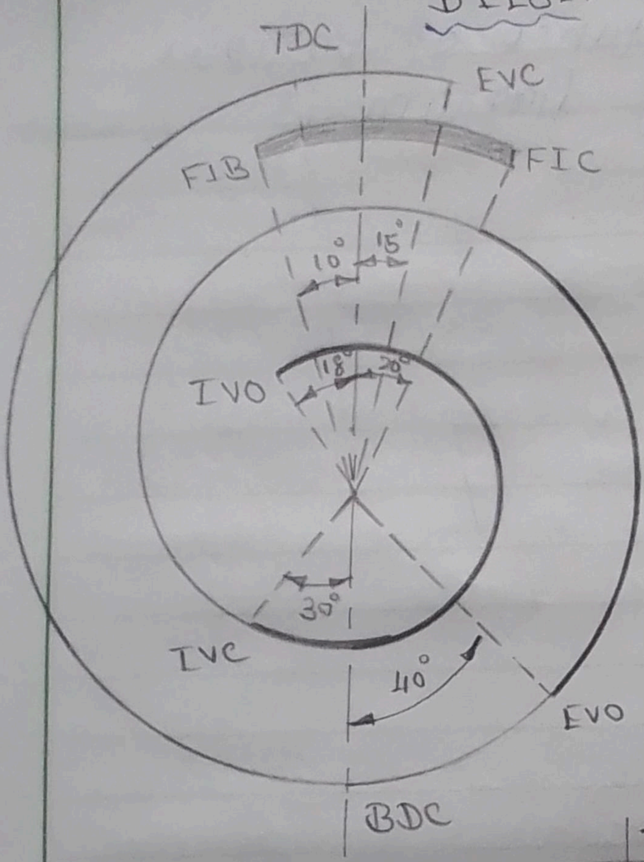
v) Ignition $= \frac{360}{450} \times 15 = 12°$

PART-A EXP 6

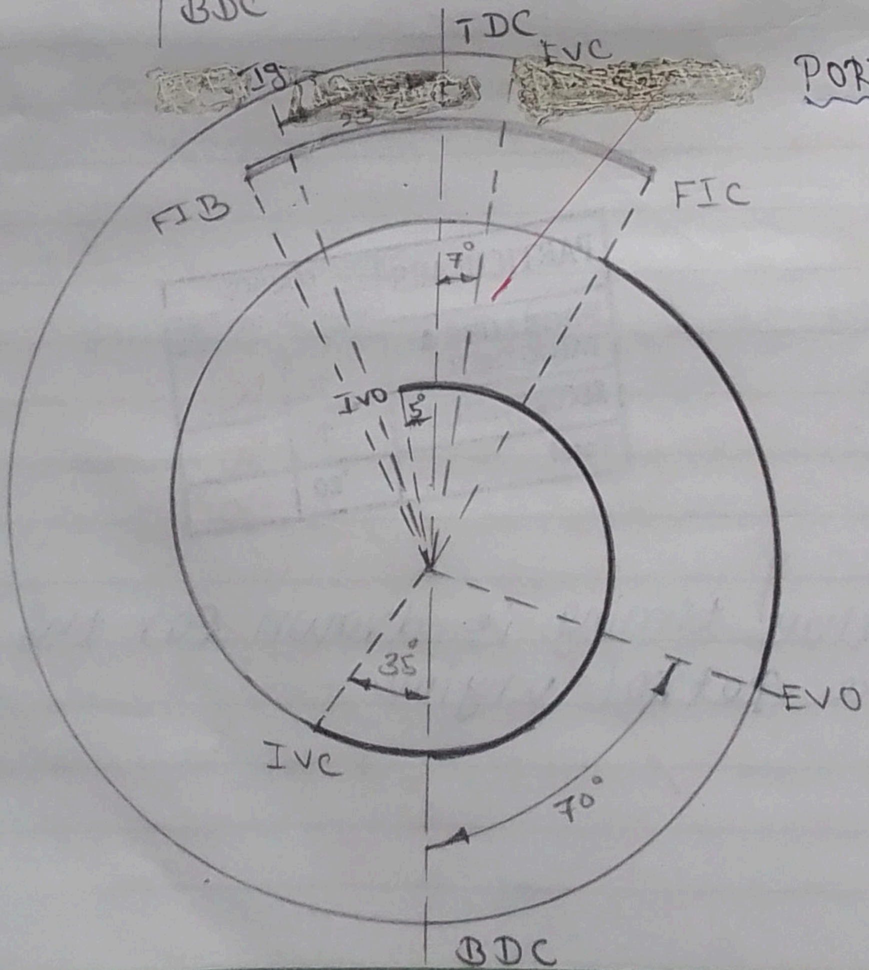
THEORETICAL VALVE TIMING DIAGRAM OF 4 STROKE DIESEL ENGINE.

IVO - Inlet valve open
IVC - Inlet valve close.
FIB - Fuel Injection Begin
FIC - Fuel Injection close.
EVO - Exhaust valve open.
EVC - Exhaust valve close.

IVO - IVC : suction.
IVC - FIB : compression.
FIB - FIC : Fuel Injection.
FIC - EVO : Expansion.
EVO - EVC : Exhaust.



PORT TIMING DIAGRAM.



PART-A EXP 6

Observation and Tabulation:-

circumference of fly wheel = 1540 mm = 360°

S. No.	Event	Before (or) After	Timing in	
			Distance in mm (x)	Angle in degree
1.	IVO	Before TDC	20	5°
2.	IVC	After BDC.	150	35°
3.	EVO	Before BDC	90	70°
4.	EVC	After TDC.	30	7°
5.	Ignition	Before TDC.	100	23°.

Model calculation:-

Angle of opening / closing of valve with respect to TDC (or) BDC = $\frac{360°}{\text{circumference of flywheel}}$ x distance fr TDC (or) BDC

i) IVO = $\frac{360}{1540} \times 20$

= 4.5°.

ii) IVC = $\frac{360}{1540} \times 150$

= 35°.

III) $EVO = \frac{360}{1540} \times 90$

$= 70^{\circ}$

iv) $EVC = \frac{360}{1540} \times 30$

$= 7^{\circ}$

v) $Ignition = \frac{360}{1540} \times 100$

$= 23^{\circ}$