2> An application requires 1.46TB of storage capacity and generates 9000 IOPS at peak Workload.
A 146 GB, 15000 RPM disk drive can deliver a maximum of 180 IOPS at full utilization

Calculate :-

i> The Number of disks required to meet both capacity and IOPS Needs

ii> Assume 70% disk utilization for optimal performance

⇒ Given Data

Application capacity	- C_A	⇒ 1.46 TB = 1460 GB
Disk capacity	- C_D	-> 146 GB
Application IOPS requirement	- I_A	- 9000 IOPS (peak Workload)
Maximum IOPS per Disk (Vendor Specified)	- I_{max}	- 180 IOPS
Disk utilization factor (for optimal performance)	- U	- 70% = 0.7

$D_R = Max(D_c, D_I)$

$D_c \rightarrow$ Number of disks required to Meet the capacity

$D_I \rightarrow$ Number of disks required the Meet the application IOPS requirement

i) Find D_c

First convert capacity units

$$C_A = 1.46TB = 1.46 \times 1000 = 1460 GB$$

$$D_c = \frac{C_A}{C_D} = \frac{1460}{146} = 10 \text{ Disks}$$

ii) D_I (IOPS requirement at 100% utilization)

$$D_I = \frac{9000}{180} = 50$$

50 disks could Meet the IOPS at full load but its unsafe because disks would queue up requests and slow down.

So we do Not consider 100% disk utilization. (at full load the disk remains continously busy causing New I/o request to queue up and drastically Increase response time)

3) D_I (utilization limit 70%)

IOPS at 70% utilization

$$I_{70} = 180 \times 0.7 = 126 \text{ IOPS}$$

Each disk can Now safely delives 126 IOPS Instead of 180

IOPS requirement at 70%

$$D_I = \frac{9000}{126} = \underline{72}$$

Find D_R (required No. of Disks to Meet both Storage capacity requirement and performance requirement)

$$D_R = \text{Max}(D_c, D_I)$$
$$\text{Max}(10, 72)$$
$$D_R = \underline{72}$$

$\boxed{D_R = 72 \text{ disks required to Meet both capacity and IOPS Needs}}$