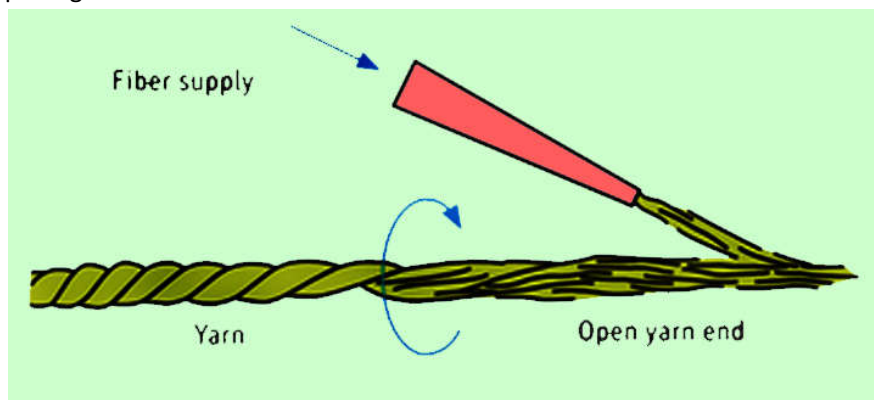


MODEL QUESTION PAPER WITH ANSWER KEY

MID TERM I

1. Explain the basic principle of rotor spinning. Also draw a neat sketch of flow of material through rotor spinning.

In open-end spinning, this flow of fibers is interrupted, the fiber strand being opened into individual fibers at a predetermined position, usually by means of an opening roller, followed by airborne fiber transport. This interruption or break in the fiber flow is physically achieved by increasing fiber speed locally to very high levels (up to 100 m/s), so that – according to the equation of continuity – the number of fibers in the cross-section drops to such low values that the fibers lose contact with each other. This enables twist to be imparted merely by rotation of the yarn end, which in turn leads to a significantly higher potential rotation speed. However, the break in fiber flow also leads directly to one of the most important and difficult tasks in open-end spinning, namely to control the configuration of the individual fibers, airborne at high speed, and the need to re-collect these fibers without losing their elongated configuration, which is essential to the formation of a new fiber strand. A constant stream of separated, individual fibers is allowed to flow to a rotating yarn end. The brush-like, open yarn end grasps the fibers brought into contact with it and continuously binds them into a yarn with the aid of the continual rolling movement. The continuously formed yarn has only to be withdrawn and taken up onto a cross-wound package.

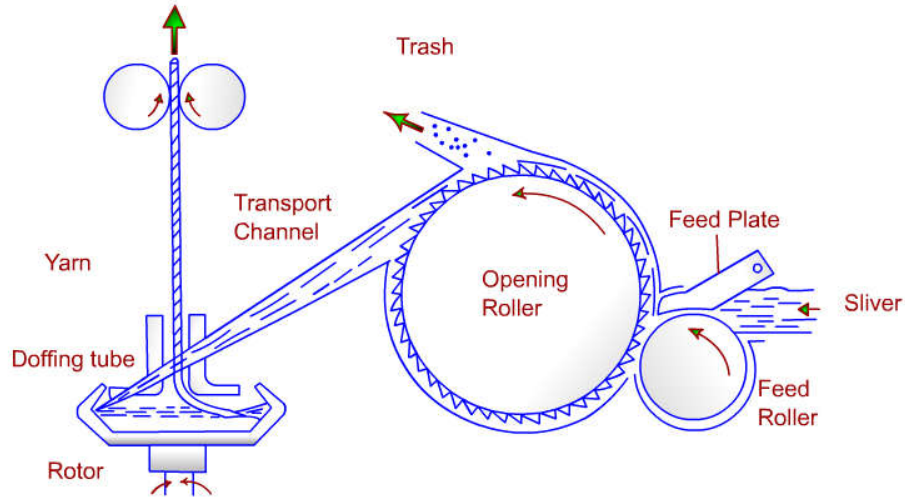


ROTOR SPINNING SYSTEM

Fibres are presented to the rotor system in the form of sliver. The feed roller in combination with the feed plate pushes the sliver against the opening roller. The opening roller rotates much faster than the feed roller. This means the fibres in the sliver are hooked by the saw tooth or pins and separated under a high draft ratio into individual fibres by the opening roller. The separated fibres are removed from the opening roller clothing by air suction flowing down the transport channel and into the rotor. Since the suction is generated externally to the rotor, the rotor is under a partial vacuum. The separated fibres are further drafted during their transportation by the air flow to the rotor.

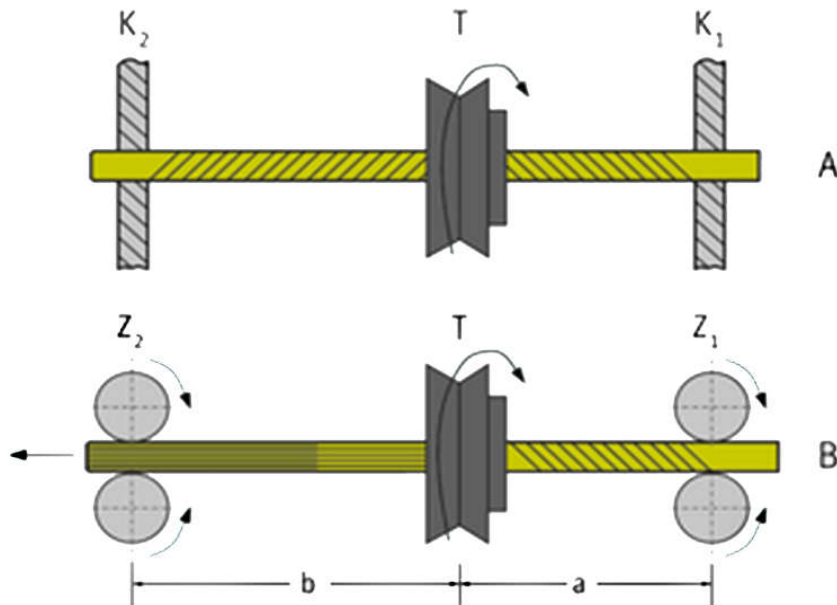
The fibres are individually deposited onto the internal wall of the rotating rotor and slide down the wall and into the rotor groove, where they accumulate to form a ribbon of fibres. To initiate spinning, the tail end of the yarn (seed length) already wound on to the package (by the package build device) is threaded through the nip of the delivery rollers and into the

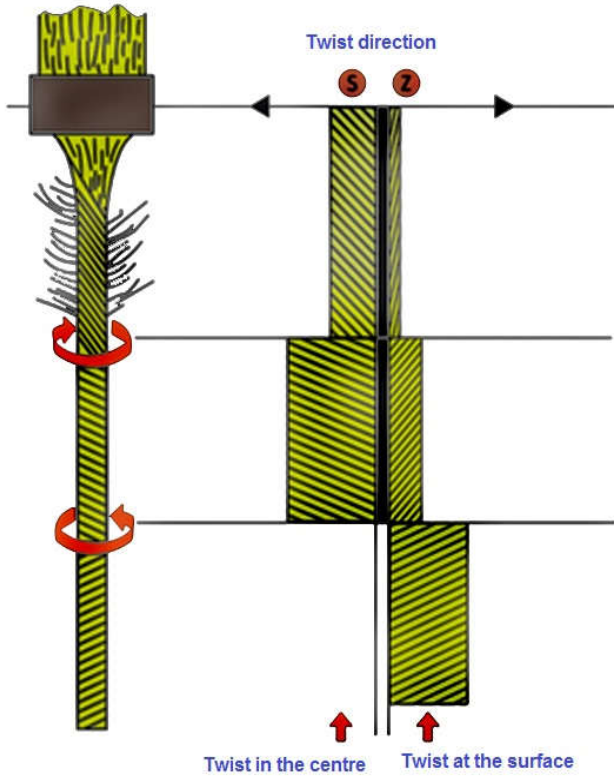
doffing tube. The partial vacuum in the rotor sucks the tail end of the yarn into the rotor. The rotation of the rotor develops air drag and centrifugal forces on the yarn, pulling the yarn end in contact with the collected fibre ribbon. Simultaneously the tail end is twisted with each revolution of the rotor. This twist propagates towards the tail end of the yarn and binds the ribbon into the yarn end. Once the yarn tail enters the rotor, the delivery rollers are set in motion to pull the tail out of the rotor. The pulling action of the tail results in the peeling of the fibre ribbon from the rotor groove. The degree of twist inserted in the tail will propagate into each length of ribbon peeled from the groove, thus forming the next length of yarn. The process is continuous because of the conservation of mass flow.



2. Explain the underlying principle of Air-jet spinning system.

PRINCIPLE OF FALSE TWISTING

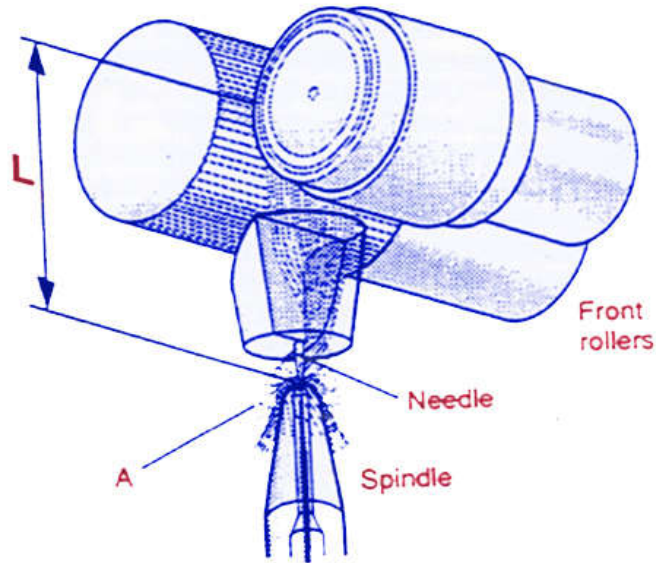




MID TERM II

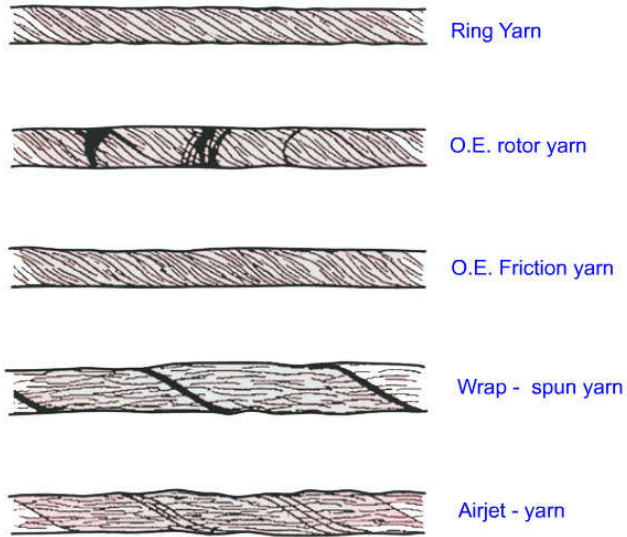
1. Discuss the working principle of Air vortex spinning.

The basic principle of operation is shown. The sliver is fed to 4-over-4 (or a four-pair) drafting unit. As the fibers come out of the front rollers, they are sucked into the spiral-shaped opening of the air jet nozzle. The nozzle provides a swirling air current which twists the fibres. A guide needle within the nozzle controls the movement of the fibres towards a hollow spindle. After the fibers have passed through the nozzle, they twine over the hollow spindle. The leading ends of the fiber bundle are drawn into the hollow spindle by the fibers of the preceding portion of the fiber bundle being twisted into a spun yarn. The finished yarn is then wound onto a package.



2. Compare the structure and properties of various yarns spun on new spinning systems with ring spun yarn.

Property	Ring Yarn	Rotor Yarn	Vortex Yarn
Parallelization and Fibre orientation	Max	Min	
Hairiness	Max		Min
Pilling	Max		Min
Strength	Max		Min
Unevenness	Max		Min
Surface smoothness	Max	Min	
Core fibres	Max		Min
Neps and Thick places	Min		Max
Bulkiness		Min	Max



The vertical axis shows the direction of twisting.

S and Z indicate the opposite direction.

The "O" point shows no twisting

