

GENERAL APTITUDE**Q. 1-Q.5 Carry one mark each**

1. Choose the most appropriate word or phrase from the options given below to complete the following sentence.

The environmentalists hope _____ the lake to its pristine condition.

- (A) in restoring (B) in the restoration of
(C) to restore (D) restoring

Answer: (C)

2. Choose the word from the options given below that is most nearly opposite in meaning to the given word:

Polemical

- (A) imitative (B) conciliatory (C) truthful (D) ideological

Answer: (B)

3. Choose the most appropriate word from the options given below to complete the following sentence.

Despite the mixture's _____ nature, we found that by lowering its temperature in the laboratory we could dramatically reduce its tendency to vaporize.

- (A) acerbic (B) resilient (C) volatile (D) heterogeneous

Answer: (C)

4. If m students require a total of m pages of stationery in m days, then 100 students will require 100 pages of stationery in

- (A) 100 days (B) $m/100$ days (C) $100/m$ days (D) m days

Answer: (D)

5. Choose the most appropriate words from the options given below to complete the following sentence.

Because she had a reputation for _____ we were surprised and pleased when she greeted us so _____.

- (A) insolence irately (B) insouciance curtly
(C) graciousness amiably (D) querulousness affably

Answer: (D)

Q. 6- Q.10 Carry Two marks each

6. The number of solutions for the following system of inequalities is

$$X_1 \geq 0$$

$$X_2 \geq 0$$

$$X_1 + X_2 \leq 10$$

$$2X_1 + 2X_2 \geq 22$$

- (A) 0 (B) infinite (C) 1 (D) 2

Answer: (A)

7. In a class of 300 students in an M.Tech programme, each student is required to take at least one subject from the following three:

M600: Advanced Engineering Mathematics

C600: Computational Methods for Engineers

E600: Experimental Techniques for Engineers

The registration data for the M.Tech class shows that 100 students have taken M600, 200 students have taken C600, and 60 students have taken E600. What is the maximum possible number of students in the class who have taken all the above three subjects?

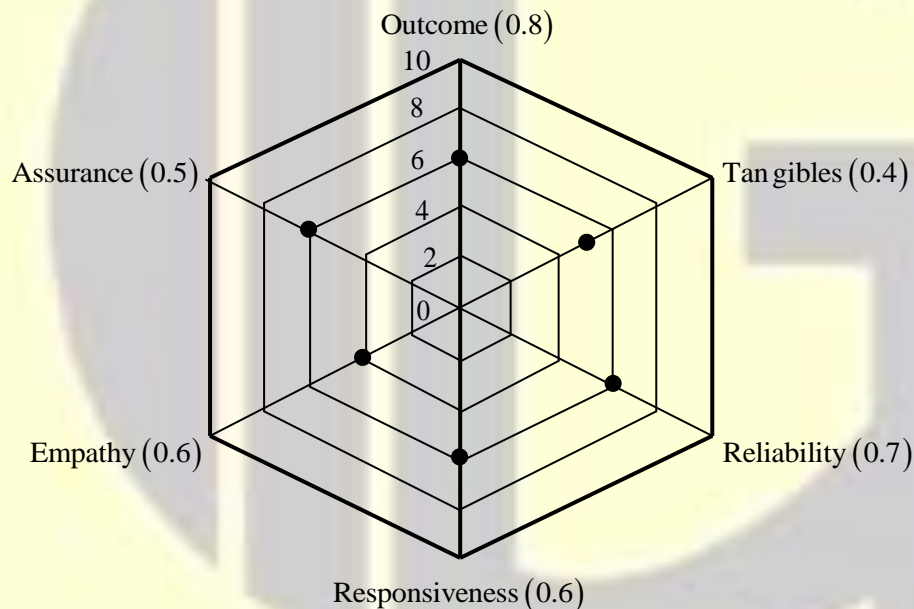
- (A) 20 (B) 30 (C) 40 (D) 50

Answer: (B)

8. Three sisters (R, S, and T) received a total of 24 toys during Christmas. The toys were initially divided among them in a certain proportion. Subsequently, R gave some toys to S which doubled the share of S. Then S in turn gave some of her toys to T, which doubled T's share. Next, some of T's toys were given to R, which doubled the number of toys that R currently had. As a result of all such exchanges, the three sisters were left with equal number of toys. How many toys did R have originally?
- (A) 8 (B) 9 (C) 11 (D) 12

Answer: (C)

9. The quality of services delivered by a company consists of six factors as shown below in the radar diagram. The dots in the figure indicate the score for each factor on a scale of 0 to 10. The standardized coefficient for each factor is given in the parentheses. The contribution of each factor to the overall service quality is directly proportional to the factor score and its standardized coefficient.



The lowest contribution among all the above factors to the overall quality of services delivered by the company is

- (A) 10% (B) 20% (C) 24% (D) 40%

Answer: (A)

10. In order to develop to full potential, a baby needs to be physically able to respond to the environment. It can be inferred from the passage that
- (A) Full physical potential is needed in order for a baby to be able to respond to the environment.
 - (B) It is necessary for a baby to be able to physically respond to the environment for it to develop its full potential.
 - (C) Response to the environment of physically able babies needs to be developed to its full potential.
 - (D) A physically able baby needs to develop its full potential in order to respond to its environment.

Answer: (B)

TEXTILE ENGINEERING

Q. 1- Q.25 Carry one mark each

1. Density of cotton fibre is approximately
- (A) 1.52 denier
 - (B) 1.52g/tex
 - (C) 1.52 kg/m³
 - (D) 1.52 g/cm³

Answer: (D)

2. The byproduct obtained from polycondensation of diethylene glycol terephthalate (DGT) is
- (A) Glycolic acid
 - (B) Water
 - (C) Diethylene glycol
 - (D) Ethylene glycol

Answer: (D)

3. Ziegler Natta catalyst is used in the polymerization of
- (A) PET
 - (B) Nylon
 - (C) Acetate
 - (D) Polypropylene

Answer: (D)

4. The cross-section of spinneret used for producing hollow fibres is
- (A) C-shaped
 - (B) Rectangular
 - (C) Annular concentric
 - (D) Triangular

Answer: (A)

5. For a given yarn count made from the same fibre, rotor spun yarn is bulkier than ring spun yarn, because
- (A) Rotor spun yarn is more even than ring spun yarn
 - (B) Navel tube peels off the fibres from rotor spun yarn surface
 - (C) Rotor spun yarn has large number of wrapper fibres
 - (D) Yarn tension in rotor spinning is lower as compared to that in ring spinning

Answer: (D)

6. Consider the statement, 'off-setting the front top drafting roller towards the front is beneficial in a ring spinning machine'. Which one of the following CANNOT be the reason for the same?
- (A) It reduces the hairiness of yarn
 - (B) It results in smooth running of top drafting roller
 - (C) It reduces end breaks
 - (D) It results in shorter spinning triangle

Answer: (A)

7. 20s, 30s, 40s and 50s Ne cotton yarns have the same twist per cm. The yarn having maximum fibre obliquity is
- (A) 20s Ne (B) 30s Ne (C) 40s Ne (D) 50s Ne

Answer: (A)

8. During roller drafting, better fibre control is achieved by flexing the fibre strand over the bottom roller. The reason for this is
- (A) Enhanced fibre to fibre coefficient of friction
 - (B) Enhanced fiber to fibre friction
 - (C) Reduced slippage of top roller
 - (D) Reduced fibre to metal friction

Answer: (B)

9. For 2/2 twill weave, the heald shaft movement over one complete repeat will be the least in
- (A) Bottom closed shed (B) Semi open shed
- (C) Centre closed shed (D) Open shed

Answer: (D)

10. In a flat bed knitting machine, the loop length is controlled by
- (A) Raising cam (B) Stitch cam
- (C) Clearing cam (D) Guard cam

Answer: (B)

11. In a drum driven winder
- (A) Traverse ratio is constant
- (B) Traverse ratio reduces with the increase in package diameter
- (C) Angle of wind increases with the increase in package diameter
- (D) Angle of wind reduces with the increase in package diameter

Answer: (B)

12. The power required for picking in a shuttle loom depends on
- (A) Weave of the fabric (B) Number of heald shafts
- (C) Reed width (D) Number of picking cams

Answer: (C)

13. Out of the following, the one which is NOT a surfactant is
- (A) Reducing agent (B) Wetting agent
- (C) Detergent (D) Dispersing agent

Answer: (A)

14. The machine used for continuous processing of fabric is
(A) Winch (B) Kier (C) J-Box (D) Jigger

Answer: (C)

15. An example of a coagulant used in textile effluent treatment is
(A) Activated carbon (B) Ferrous sulphate
(C) Hydrogen peroxide (D) Sodium chloride

Answer: (B)

16. Microbes growing on clothing derive nutrition from
(A) Atmospheric oxygen (B) Digestion of polymer
(C) Sweat and contaminants (D) Moisture in the air

Answer: (C)

17. If the 50 % span length of a cotton fibre is 13.5 mm and the uniformity ratio is 45 %, then 2.5 % span length of this fibre in mm would be
(A) 10 (B) 15 (C) 30 (D) 35

Answer: (C)

18. The nep setting on an evenness tester which will give the highest nep count is
(A) +400% (B) +280% (C) +200% (D) +140%

Answer: (D)

19. Fabrics with the same sett but different weaves are woven on a loom. The tear strength will be minimum in a fabric having
(A) Plain weave (B) 3/1 twill weave
(C) 5-end satin weave (D) 2/2 matt weave

Answer: (A)

20. The property of fabric which influences drape the most is
- (A) Tensile (B) Compressional
(C) Shear (D) Surface

Answer: (C)

21. Probability of occurrence of two events E_1 and E_2 is 0.25 and 0.5, respectively. The probability of their simultaneous occurrence is 0.14. The probability that neither E_1 nor E_2 occurs is
- (A) 0.11 (B) 0.25 (C) 0.39 (D) 0.86

Answer: (C)

22. The value of $\lim_{x \rightarrow 0} \frac{(1+x)^n - 1}{x}$ is
- (A) 0 (B) n (C) ∞ (D) $1/n$

Answer: (B)

23. The area of an ellipse with 'a' and 'b' as the length of major and minor axis, respectively, is
- (A) πab (B) $\pi \frac{(a+b)}{2}$ (C) $\pi \frac{ab}{4}$ (D) $\pi \frac{ab}{2}$

Answer: (C)

24. The order and degree of the following differential equation are

$$x \left(\frac{dy}{dx} \right) + \frac{2}{\left(\frac{dy}{dx} \right)} = y^2$$

- (A) order 1, degree 1 (B) order 1, degree 2
(C) order 2, degree 1 (D) order 2, degree 2

Answer: (B)

25. X and Y are two matrices such that XY and $X+Y$ are both defined. The CORRECT statement from amongst the following is
- (A) X and Y are square matrices of the same order
 - (B) X is a square matrix whereas Y is a rectangular matrix
 - (C) X and Y are diagonal matrices of different order
 - (D) X and Y are rectangular matrices

Answer: (A)

Q. 26- Q.55 Carry Two marks each

26. A filament yarn of 300 denier is being spun at a take up speed of 900 m/min. Assuming the density of the melt as 1.2 g/cm^3 , the throughput speed (cm^3/min) at the spinneret would be _____.

Answer: (24.9 to 25.1)

27. The delivery rate of a roving machine is 20 m/min. Assuming the flyer speed as 1000 rpm, inner diameter of the flyer top as 1 cm, diameter of roving as 2.5 mm, and the slippage between the flyer top and roving as 50 %, the false twist (turns/m) in the roving above the flyer is _____.

Answer: (99.9 to 100.1)

28. For a sizing process, the target add-on (%) and the size paste concentration (%) is 10 and 20, respectively. If the oven dry mass of the supply warp sheet is 100 kg, the mass of water in kg to be evaporated from the warp sheet during drying is _____.

Answer: (39.9 to 40.1)

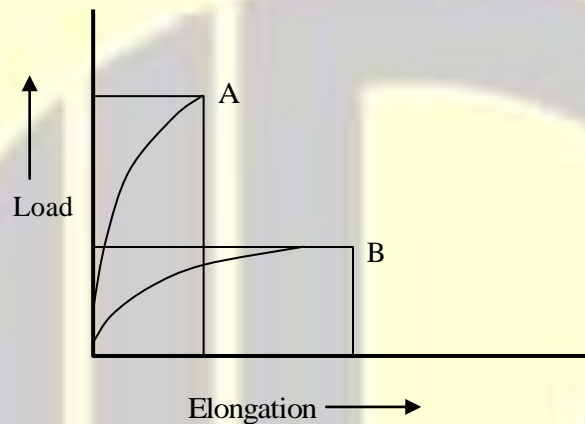
29. A garment factory manufactures shirts. From the past history, it is known that 8 out of 100 collars and 5 out of 100 sleeves are defective. The probability that the assembled shirt will NOT have either of these defects is _____.

Answer: (0.87 to 0.88)

30. A yarn has mean strength of 10 N with a standard deviation of 1 N. The number of tests which must be conducted, so that at 95 % confidence level, maximum error in the estimated mean strength is 1.96 %, is _____.

Answer: (99.9 to 100.1)

31. Given below are the load-elongation characteristics of two monofilament yarns A and B having the same denier and the work of rupture. Consider the following assertion [a] and reason [r].



[a] Fabrics made from these two yarns, with the same weave and sett, will have the same resistance to high impact.

[r] The work of rupture of the two fabrics is the same.

- (A) [a] is right and [r] is wrong (B) [a] is wrong and [r] is right
(C) Both [a] and [r] are right (D) Both [a] and [r] are wrong

Answer: (D)

32. Consider the following assertion [a] and reason [r] in the case of high bulk yarn.

[a] Acrylic high bulk yarn is a commercial success but not the polypropylene high bulk yarn.

[r] Amorphous orientation can be easily frozen in acrylic fibres but not in polypropylene fibres.

- (A) [a] is right and [r] is wrong (B) [a] is wrong and [r] is right
(C) Both [a] and [r] are right (D) Both [a] and [r] are wrong

Answer: (C)

33. Match the items in Group I with those in Group II.

Group I	Group II
P. Crystallinity	1. Sonic modulus tester
Q. Surface features	2. Infrared spectrophotometer
R. Orientation	3. Scanning electron microscope
S. Functional groups	4. Differential scanning calorimeter

(A) P-1, Q-2, R-3, S-4

(B) P-3, Q-2, R-1, S-4

(C) P-4, Q-3, R-1, S-2

(D) P-4, Q-3, R-2, S-1

Answer: (C)

34. Determine the correctness or otherwise of the following assertion [a] and reason [r].

[a] When the bales are highly compressed, photo cells near the inclined spiked lattice of a Hopper bale opener are set at a lower height.

[r] Position of photo cells controls the mass flow rate of tufts within the Hopper bale opener

(A) [a] is right and [r] is wrong

(B) [a] is wrong and [r] is right

(C) Both [a] and [r] are right

(D) Both [a] and [r] are wrong

Answer: (C)

35. The ring rail moves up and down in a cyclic manner during formation of a cop. The combination of events occurring during upward traverse of the ring rail is

P. Traveller speed decreases

Q. Balloon tension decreases

R. More yarn is wound by the traveller

S. Balloon tension increases

(A) P, Q, S

(B) P, Q, R

(C) Q, R, S

(D) P, R, S

Answer: (D)

36. Match the items in Group I with those in Group II.

Group I	Group II
P. Ring spinning	1. Real twist, mechanical twisting, low fibre migration, aerodynamic drafting
Q. Rotor spinning	2. False twist, aerodynamic twisting, low fibre migration, roller drafting
R. Air-vortex spinning	3. Real twist, mechanical twisting, high fibre migration, roller drafting
S. Air-jet spinning	4. Real twist, aerodynamic twisting, high fibre migration, roller drafting

(A) P-3, Q-2, R-1, S-4

(B) P-4, Q-3, R-2, S-1

(C) P-3, Q-1, R-4, S-2

(D) P-3, Q-2, R-4, S-1

Answer: (C)

37. For a $5/3$ twill weave, if the rotational speeds of the crank shaft, bottom shaft and tappet shaft are X, Y and Z respectively, then X:Y:Z would be

(A) 1:4:8

(B) 8:4:1

(C) 2:1:1

(D) 2:1:8

Answer: (B)

38. In air-jet weaving, the acceleration of the weft yarn will be maximum when the yarn is

(A) Coarser and more hairy

(B) Coarser and less hairy

(C) Finer and less hairy

(D) Finer and more hairy

Answer: (D)

39. For a plain woven fabric, the diameters of warp and weft yarns are 0.2 mm and 0.3 mm, respectively. The crimp in warp yarn is 9 % and pick spacing is 0.4 mm. The fabric thickness in mm is

(A) 0.32

(B) 0.50

(C) 0.64

(D) 0.75

Answer: (C)

40. Match the items in Group I with those in Group II.

Group I	Group II
P. Sodium formaldehyde sulfoxylate	1. Hygroscopic agent
Q. Urea	2. Mild oxidizing agent
R. Resist salt	3. Thickener
S. Carboxy methyl cellulose (CMC)	4. Reducing agent

(A) P-2, Q-3, R-1, S-4

(B) P-4, Q-1, R-3, S-2

(C) P-3, Q-4, R-2, S-1

(D) P-4, Q-1, R-2, S-3

Answer: (D)

41. Determine the correctness or otherwise of the following assertion [a] and the reason [r].

[a] Phosphorus and nitrogen based agents act as vapour phase flame retardants for cotton.

[r] Phosphorus yields phosphoric acid and hinders formation of levoglucosan while nitrogen has a synergistic effect.

(A) [a] is right and [r] is wrong

(B) [a] is wrong and [r] is right

(C) Both [a] and [r] are right

(D) Both [a] and [r] are wrong

Answer: (B)

42. Match the items in Group I with those in Group II.

Group I	Group II
P. Crabbing	1. Cut and remove projecting fibres
Q. Decatising	2. Moisture, heat, mechanical action
R. Milling	3. Perforated drum with saturated steam
S. Cropping	4. Winding, treatment with hot water

(A) P-4, Q-3, R-2, S-1

(B) P-3, Q-4, R-2, S-1

(C) P-2, Q-3, R-4, S-1

(D) P-4, Q-3, R-1, S-2

Answer: (A)

43. The coarsest yarn amongst the following is

- (A) 100 Ne (B) 50 denier (C) 50 dtex (D) 200 Nm

Answer: (A)

44. Two cotton fibre varieties X and Y having linear density of 3.1 and 3.9 (micrograms/25.4 mm), respectively, are tested on an airflow instrument. The highest flow rate is obtained in the case of

- (A) Fibre X with maturity ratio 0.9 (B) Fibre X with maturity ratio 1.0
(C) Fibre Y with maturity ratio 0.9 (D) Fibre Y with maturity ratio 1.0

Answer: (D)

45. Warp and weft yarns with diameters of 0.4 mm and 0.6 mm, respectively, are used to produce plain woven fabric with end spacing of 0.8 mm and pick spacing of 1.2 mm. Assuming the degree of flattening to be 0.8 in both warp and weft yarns, the approximate fabric cover would be

- (A) 0.56 (B) 0.66 (C) 0.76 (D) 0.86

Answer: (D)

46. If the error in the measurement of the diameter of a yarn is 0.5 %, the error in the estimated cross-sectional area of this yarn would be

- (A) 0.25 % (B) 1.0 % (C) 2.5 % (D) 5.0 %

Answer: (B)

47. The acceleration (a) of a cotton tuft flowing through a duct in a straight line follows the relationship

$$a = 8 - \frac{t}{5}$$

Where acceleration (a) is in cm/s^2 and time (t) is in s. The velocity (cm/s) of the tuft when acceleration is zero is

- (A) 160 (B) 180 (C) 200 (D) 220

Answer: (A)

Common Data for Questions: 48 & 49

Consider the following data for a synthetic fibre.

Density of amorphous region (ρ_a) as 1.33 g/cm^3 , density of crystalline region (ρ_c) as 1.45 g/cm^3 , density of fibre (ρ_f) as 1.36 g/cm^3 and diameter of the fibre as 14 micron.

48. Denier of the fibre is approximately

- (A) 1 (B) 2 (C) 3 (D) 4

Answer: (D)

49. Density of the above fibre increased by 2.2 % when drawn. The corresponding change (%) in crystallinity is approximately

- (A) 50 (B) 100 (C) 150 (D) 200

Answer: (B)

Common Data for Questions: 50 & 51

A card with a doffer of diameter 60 cm, fed with a lap of 395 ktex delivers sliver of 3.95 ktex. The draft between the doffer and the coiler calender roller is 1.4.

50. The total draft of the card is

- (A) 71 (B) 140 (C) 100 (D) 171

Answer: (C)

51. If the doffer speed is 50 rpm, the approximate production rate of the card in kg/h would be

- (A) 6 (B) 22 (C) 31 (D) 88

Answer: (C)

Statement for Linked Answer Questions: 52 & 53

For a shuttle loom, the radius of crank and length of the connecting rod to the sley are 10 cm and 40 cm, respectively.

52. The value of sley eccentricity is

- (A) 0.25 (B) 0.50 (C) 1.0 (D) 4.0

Answer: (A)

53. The ratio of sley acceleration at the front centre and back centre of the loom is

- (A) 0.25 (B) - 0.60 (C) - 1.67 (D) 4.0

Answer: (C)

Statement for Linked Answer Questions: 54 & 55

Four percent add on (owf) of a finish is required on a fabric having a weight of 0.60 kg/m. Consider the wet pick up as 80 %, speed of the fabric as 90 m/min and density of liquor as 1.2 g/ml.

54. Concentration (%) of the finish required in the bath is

- (A) 0.2 (B) 3.2 (C) 5.0 (D) 32

Answer: (C)

55. Finish consumed in kg/min is

- (A) 2.16 (B) 2.70 (C) 5.00 (D) 5.40

Answer: (A)