GENERAL APTITUDE

Q. 1- Q.5 Carry one mark each

1. The chairman requested the aggrieved shareholders to _____ him.

(A) bare with (B) bore with (C) bear with (D) bare

Answer: (C)

---

2. Identify the correct spelling out of the given options:

(A) Managable (B) Manageable (C) Mangaeble (D) Managible

Answer: (B)

---

3. Pick the odd one out in the following:

13, 23, 33, 43, 53

(A) 23 (B) 33 (C) 43 (D) 53

Answer: (B)

---

4. R2D2 is a robot. R2D2 can repair aeroplanes. No other robot can repair aeroplanes.

Which of the following can be logically inferred from the above statements?

(A) R2D2 is a robot which can only repair aeroplanes

(B) R2D2 is the only robot which can repair aeroplanes

(C) R2D2 is a robot which can repair only aeroplanes

(D) Only R2D2 is a robot

Answer: (B)

---

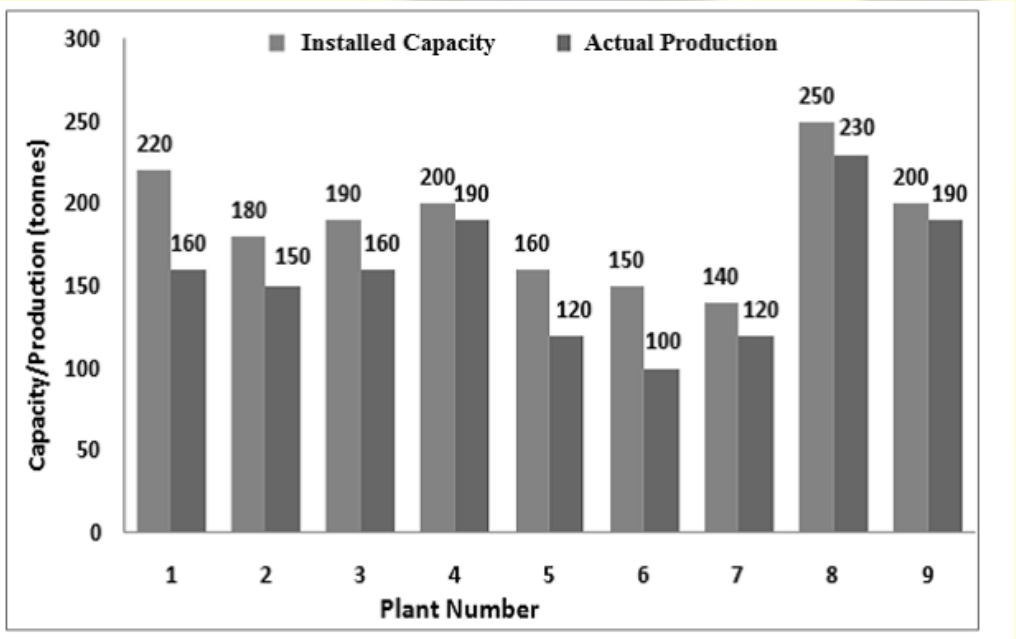
5. If $|9y-6|=3$, then $y^2-4y/3$ is_____.

(A) 0 (B) +1/3 (C) -1/3 (D) undefined

Answer: (C)

Q. 6- Q. 10 carry two marks each.

6. The following graph represents the installed capacity for cement production (in tonnes) and the actual production (in tonnes) of nine cement plants of a cement company. Capacity utilization of a plant is defined as ratio of actual production of cement to installed capacity. A plant with installed capacity of at least 200 tonnes is called a large plant and a plant with lesser capacity is called a small plant. The difference between total production of large plants and small plants, in tonnes is ____.



Answer: (120)

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7. A poll of students appearing for masters in engineering indicated that 60 % of the students believed that mechanical engineering is a profession unsuitable for women. A research study on women with masters or higher degrees in mechanical engineering found that 99 % of such women were successful in their professions.

Which of the following can be logically inferred from the above paragraph?

(A) Many students have misconceptions regarding various engineering disciplines.

(B) Men with advanced degrees in mechanical engineering believe women are well suited to be mechanical engineers.

(C) Mechanical engineering is a profession well suited for women with masters or higher degrees in mechanical engineering.

(D) The number of women pursuing higher degrees in mechanical engineering is small.

Answer: (C)

8. Sourya committee had proposed the establishment of Sourya Institutes of Technology (SITs) in line with Indian Institutes of Technology (IITs) to cater to the technological and industrial needs of a developing country.

Which of the following can be logically inferred from the above sentence?

Based on the proposal,

(i) In the initial years, SIT students will get degrees from IIT.

(ii) SITs will have a distinct national objective.

(iii) SIT like institutions can only be established in consultation with IIT.

(iv) SITs will serve technological needs of a developing country.

(A) (iii) and (iv) only (B) (i) and (iv) only

(C) (ii) and (iv) only (D) (ii) and (iii) only

Answer: (C)

---

9. Shaquille O' Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average. What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

(A) 0.2508 (B) 0.2816 (C) 0.2934 (D) 0.6000

Answer: (A)

---

10. The numeral in the units position of $211^{870}+146^{127}\times 3^{424}$ is _____.

Answer: (7)

TEXTILE ENGINEERING

Q. 1- Q.25 Carry one mark each

1. The following partial differential equation $U_{xx} + U_{yy} = 0$ is of the type

(A) Elliptic (B) Parabolic (C) Hyperbolic (D) Mixed type

Answer: (A)

---

2. Which of the following is a multi-step numerical method for solving the ordinary differential equation?

(A) Euler method (B) Improved Euler method

(C) Runge-Kutta method (D) Adams-Multon method

Answer: (D)

---

3. Let X be a normally distributed random variable with mean 2 and variance 4. Then, the mean of $\frac{x-2}{2}$ is equal to _____.

Answer: (–0.01 to 0.01)

---

4. Let $A = \begin{pmatrix} 1 & \frac{1}{2} \\ \frac{1}{2} & 1 \end{pmatrix}$. The determinant of A^{-1} is equal to

(A) $\frac{1}{2}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) 2

Answer: (B)

---

5. Which of the following amino acids is responsible for relatively higher wet strength in wool fiber?

(A) Threonine (B) Serine (C) Cystine (D) Tryosine

Answer: (C)

6. Which one of the following stereo structures of polypropylene is (are) used for commercial fibremanufacture?

(A) Atactic (B) Syndiotactic

(C) Isotactic & Syndiotactic (D) Isotactic

Answer: (D)

---

7. Acrylic fibre has high glass transition temperature $\left(T_g \approx 100°C\right)$ primarily due to

(A) Presence of polar side groups (B) Presence of bulky side groups

(C) High crystallinity (D) Main chain stiffness

Answer: (A)

---

8. In which of the following polymerization methods the rate of reaction is very high and leads to uncontrolled polymerization?

(A) Solution polymerization (B) Suspension polymerization

(C) Bulk polymerization (D) Emulsion polymerization

Answer: (C)

---

9. Which of the following textile strands is the finest?

(A) 30s Ne (B) 30 denier (C) 30 tex (D) 30s Nm

Answer: (B)

---

10. In a carding machine, in which of the following zones the fibre alignment is negatively affected to the maximum extent?

(A) Cylinder to flats carding region (B) Licker-in to cylinder transfer region

(C) Cylinder to doffer transfer region (D) Doffer to calendar roller region

Answer: (C)

11. Which of the following is the correct sequence of events which happen in a roller drafting zone?

(A) Fibre elongation-fibre decrimping- fibre sliding

(B) Fibre sliding-fibre elongation-fibre decrimping

(C) Fibre decrimping- fibre sliding- fibre elongation

(D) Fibre decrimping- fibre elongation- fibre sliding

Answer: (D)

---

12. In which region of ring spinning, Coriolis force acts?

(A) Lappet to ring cop

(B) Delivery pair of drafting rollers to lappet

(C) Back pair of drafting rollers to delivery pair of drafting rollers

(D) Feed bobbin to back pair of drafting rollers

Answer: (A)

---

13. Which of the following shuttleless weaving systems can offer maximum fabric width?

(A) Air jet (B) Water jet (C) Projectile (D) Rapier

Answer: (C)

---

14. The filling yarn density at selvage is doubled in case of

(A) Fringe selvage (B) Tucked-in selvage

(C) Shuttle selvage (D) Leno selvage

Answer: (B)

---

15. Which of the following shedding mechanisms provides control of individual warp thread during weaving?

(A) Crank (B) Tappet (C) Dobby (D) Jacquard

Answer: (D)

16. The time required (minutes) to wind 10 kg of 40 tex yarn when the winding machine works at 1000 m/min with an efficiency of 90% is _____

Answer: (275 to 280)

---

17. The test statistic to be used for carrying out a test of hypothesis on the mean of a normal distribution with unknown variance is

(A) Z (B) T (C) χ^2 (D) F

Answer: (B)

---

18. If the length of a confidence interval on the mean of a normal distribution with known variance is to be halved, the sample size must

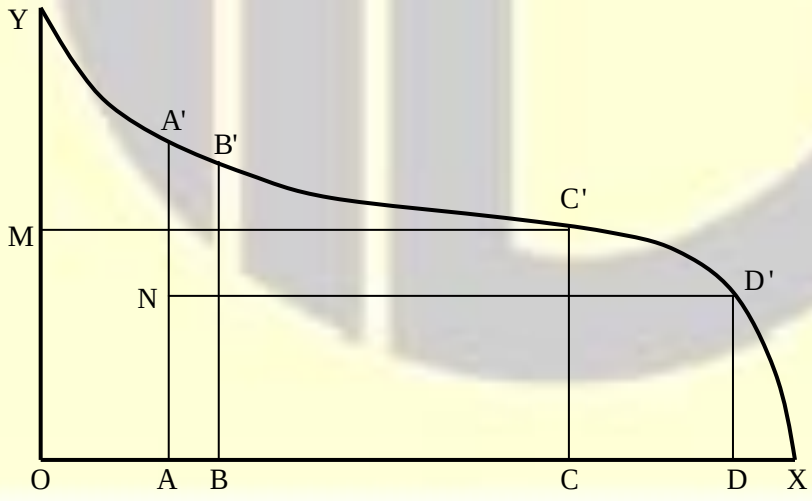
(A) increase by 2 times (B) decrease by 2 times

(C) increase by 4 times (D) decrease by 4 times

Answer: (C)

---

19. A comb sorter diagram of cotton fibres is shown below:



where OM=0.5 OY, OA=0.25 OC, AN=0.5 AA', and OB=0.25 OD. The effective length is

(A) AA' (B) BB' (C) CC' (D) DD'

Answer: (B)

20. A fabric specimen of original length 75 mm is stretched to a length of 120 mm and after removal of the load the length reduces to 95 mm. The elastic recovery (%) of the fabric specimen is _____

Answer: (55 to 56)

---

21. A sector-shaped, falling-pendulum type apparatus is suitable for measurement of

(A) Elmendorf tear strength (B) Tongue tear strength

(C) Trapezoidal tear strength (D) All of them

Answer: (A)

---

22. Sodium persulphate is used in

(A) Bleaching (B) Scouring

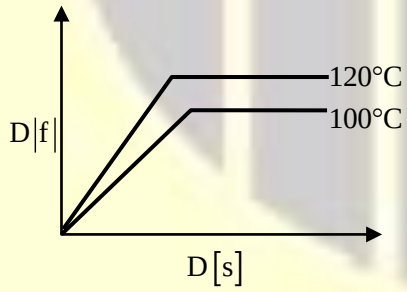
(C) Mercerization (D) Desizing

Answer: (B)

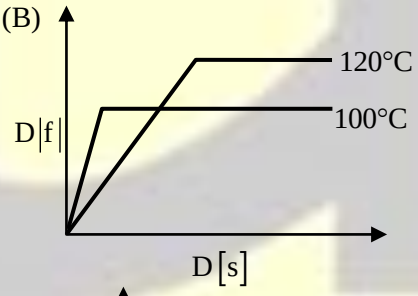
---

23. Polyester is dyed with a disperse dye at 100 ^{o}C and 120^{o}C till equilibrium is achieved. If D[f] and D[s] represent the dye in fibre and dye in solution respectively, then the correct choice for the dyeing isotherms at the two temperature will be

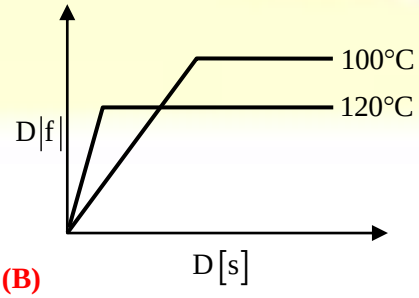
(A)



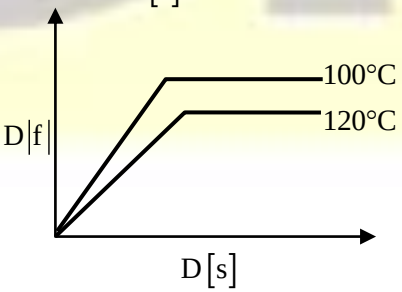
(B)



(C)



(D)



Answer: (B)

24. A dye with dischargeability rating of 1 (one) WILL NOT be suitable for

(A) Resist printing (B) Direct printing

(C) Discharge printing (D) Melt transfer printing

Answer: (C)

---

25. The enzyme used for biopolishing of cotton is

(A) Cellulase (B) Pectinase

(C) Amylase (D) Lipase

Answer: (A)

Q. 26- Q.55 Carry one mark each

26. The eigen values and eigen vectors of $\begin{pmatrix} 3 & 4 \\ 4 & -3 \end{pmatrix}$ are

(A) ± 5 and $\begin{pmatrix} 1 \\ 2 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ respectively (B) ± 3 and $\begin{pmatrix} 1 \\ 2 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ respectively

(C) ± 4 and $\begin{pmatrix} 1 \\ 2 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ respectively (D) ± 5 and $\begin{pmatrix} 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ respectively

Answer: (A)

---

27. Let $f(x,y,z) = \dfrac{1}{\sqrt{(x^2+y^2+z^2)}}$. The value of $\dfrac{\partial^2 f}{\partial x^2} + \dfrac{\partial^2 f}{\partial y^2} + \dfrac{\partial^2 f}{\partial z^2}$ is equal to _____.

Answer: (–0.01 to 0.01)

---

28. Let X be a continuous type random variable with probability density function

$$f(x) = \begin{cases} \dfrac{1}{4} & ; -1 \le x \le 3 \\ 0 & ; \text{otherwise} \end{cases}$$

. When $P(x \le x) = 0.75$, the value of x is equal to _____.

Answer: (1.99 to 2.01)

29. The integrating factor of $\left(2\cos y + 4x^2\right)dx - x\sin y\, dy = 0$ is

(A) $-x$ (B) x (C) x^2 (D) $-x^2$

Answer: (B)

---

30. The Fourier series of periodic function $f(x) = \begin{cases} -k & -\pi < x < 0 \\ k & 0 < x < \pi \end{cases}$ and $f(x + 2\pi) = f(x)$ = f (x) is given by $\frac{4k}{\pi}\left(\sin x + \frac{1}{3}\sin 3x + \frac{1}{5}\sin 5x + \ldots\right)$. Then, the value of $\frac{4}{\pi}\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots\right)$ is equal to _____.

Answer: (0.99 to 1.01)

---

31. Match the fibers listed in Column A with the compounds used in its manufacture listed in Column B. Choose the right answer from options A, B, C and D.

Column A	Column B
P. Polypropylene	**1.** Carbon disulfide
Q. Polyethylene Terephthalate	**2.** Water
R. Nylon 6	**3.** Ziegler Natta catalyst
S. Viscose	**4.** Antimony trioxide & Antimony triacetate

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

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

Answer: (B)

---

32. Consider the following assertion [a] and reason [r] and choose the correct alternative from amongst A, B, C and D.

[a] Both polyester and nylon filaments can be drawn at room temperature to achieve higher strength, modulus and dimensional stability.

[r] T_g of both polyester and nylon can be lowered to room temperature on absorption of atmospheric moisture.

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

(C) [a] is wrong and [r] is wrong (D) [a] is wrong and [r] is right

Answer: (D)

33. Low pill PET fibres of a given denier can be produced by a combination of any two options listed below. Choose the right combination from A, B, C and D.

P. Lowering the IV (intrinsic viscosity) of the polymer

Q. Increasing the IV (intrinsic viscosity) of the polymer

R. Increasing the draw ratio

S. Decreasing the draw ratio

(A) P,S (B) P,R (C) Q,S (D) Q,R

Answer: (A)

---

34. Which of the following combination of statements from options A, B, C and D is correct?

1. X-ray Diffraction gives information about crystallinity and crystal size in semicrystalline polymers.

2. Differential Scanning Calorimetery gives information about T_g, T_m and T_c as well as enthalpy of melting and crystallization.

3. In Scanning Electron Microscopy the sample has to be coated with silver to make it conducting.

4. Birefringence is a measure of molecular orientation in amorphous phase only.

(A) 1, 2 and 3 are correct (B) 1, 3 and 4 are correct

(C) 2, 3 and 4 are correct (D) All are correct

Answer: (A)

---

35. Match the fibre in Column A with the spinning technique used to manufacture in Column B. Choose the correct alternative from options A, B, C and D.

Column A	Column B
P. Rayon	**1.** Dry-jet-wet spinning
Q. Aramid (Kevlar)	**2.** Gel Spinning
R. Ultra High Molecular weight Polyethylene	**3.** Melt spinning
S. Polyester	**4.** Wet Spinning

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

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

Answer: (D)

36. If 50 bales of 5 μg/inch, 20 bales of 3.5 μg/inch and 40 bales of 3.0 μg/inch cotton fibres are mixed, the resultant μg/inch of the mixed cotton is _____

Answer: (3.7 to 3.85)

---

37. A rotor with 48 mm diameter running at 90,000 rpm is producing yarn at 140 m/min. The numberof doublings of fibre layers in the rotor is _____

Answer: (96.85 to 97.05)

---

38. Consider the following assertion [a] and reason [r] and choose the correct alternative from amongst A, B, C and D.

[a] Compared to ring spun yarns, rotor spun yarns have better evenness for the same yarn count.

[r] Rotor spun yarns have more number of fibres in the yarn cross section compared to ring spun yarns of same count.

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

Answer: (A)

---

39. The final yarn count required from a ring frame is 36s Ne with 28 TPI. The twist contraction during spinning is 3%. If the feed roving count is 2s Ne, the mechanical draft required in the ring frame will be _____

Answer: (18.40 to 18.65)

---

40. The diameter (mm) of a cotton yarn of 50 tex count and 0.45 packing density, assuming cotton fibre density to be $1.54 g/cm^3$, is _____

Answer: (0.29 to 0.31)

---

41. In needle punching process, higher punch density CAN NOT cause

(A) Lower web thickness
(B) Higher change of fabric dimensions
(C) Higher damage of fibres
(D) Higher permeability of fabric

Answer: (D)

42. Which of the following features IS NOT found in a crepe weave

(A) Highly irregular surface-puckered in appearance

(B) Prominent twill effect on the fabric

(C) Minute spots or seeds spread over the fabric

(D) High twist yarn with controlled shrinkage

Answer: (B)

---

43. The crimp% of a square cloth in which thread spacing is equal to the yarn diameter and no jamming takes place, will be _____

Answer: (56 to 57)

---

44. A 38 cm diameter circular knitting machine accommodates 4 needles per cm. The stitch length is 6 mm and wale constant can be assumed to be 42.2. The flat fabric width (cm) in finished – relaxed form is _____

Answer: (67 to 68)

---

45. The least desired feature of fibre in wet laid nonwoven fabric is

(A) High affinity for water

(B) Low aspect ratio

(C) High flexural rigidity

(D) Low crimpiness

Answer: (C)

---

46. The surface area per unit volume $\left(\text{mm}^{-1}\right)$ of a circular polyester fibre of 1.5 denier fineness and $1.38\,\text{g/cm}^3$ density, ignoring the fibre ends, is _____.

Answer: (322 to 322)

---

47. The fibre packing density in a cotton bale of 170 kg weight and dimensions 1060 mm $(\text{L}) \times 530$ mm $(\text{W}) \times 780$ mm (H), assuming cotton fibre density to be $1.54\,\text{g/cm}^2$, is _____ .

Answer: (0.24 to 2.6)

48. A cotton yarn with 5% breaking elongation needs to be tested for breaking strength in a tensile tester at 500 mm gauge length. The clamp speed (mm/min) required to break the specimen in 20 s is _____.

Answer: (74.90 to 75.10)

---

49. The rotational speed of a card cylinder with locally damaged card clothing is 400 rpm and the sliver delivery rate is 100 m/min. The wavelength (m) of the periodic mass variation in the card sliver is_____ .

Answer: (0.24 to 0.26)

---

50. The flexural rigidity, expressed in 10^{-4} mg.cm, of a fabric test specimen of $100\,g/m^2$ areal density and 0.40 mm length of overhang determined using a cantilever test with a standard angle of deflection of 41.5°, is _____.

Answer: (0.79 to 0.85)

---

51. The volume strength of 1 molar H_2O_2 solution will be _____.

Answer: (11.00 to 11.40)

---

52. Consider the following assertion [a] and reason [r] and choose the correct alternative from amongst A, B, C and D.

[a] In dyeing of polyester with disperse dyes, it is easier to obtain dark shades with solvent dyeingmethod than with aqueous dyeing method.

[r] The partition coefficient (D[f]/D[s]) of disperse dyes is much lower in aqueous medium than in asolvent.

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

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

(C) [a] is wrong and [r] is wrong

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

Answer: (C)

53. A reactive dye is applied on cotton fabric by continuous method. The achieved shade on fabric is 2% on the weight of fabric. The dyebath concentration is 25 gram per litre and the % expressionafter padding is 100. The specific gravity of the solution is 1. The fixation % of the dye on thefabric is _____

Answer: (79.9 to 80.1)

---

54. Consider the following assertion [a] and reason [r] and choose the correct alternative from amongst A, B, C and D.

[a] In resin finishing of cellulosic textiles, usually the curing stage is carried out in hot dry air andnot in steam.

[r] The acid catalyst used in resin formulation is activated in hot air only.

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

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

(C) [a] is wrong and [r] is wrong

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

Answer: (A)

---

55. Match the printing processes in Column A with print paste components in Column B. Choose thecorrect alternative from options A, B, C and D.

Column A	Column B
P. Pigment printing	**1.** Disperse dye
Q. Discharge printing	**2.** Binder
R. Resist printing	**3.** High solids content thickener
S. Sublimation transfer printing	**4.** Sodium formaldehyde sulphoxylate

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

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

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

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

Answer: (B)