Total No. of Printed Pages : 13

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A

SET-X

Ph.D-EE-December, 2024
Textile Engineering

10005

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

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1. Which fiber has the least density ?

   (1) Polyester (2) Cotton (3) Viscose (4) Polypropylene

2. Water is added to caprolactam during the polymerization of Nylon 6. The primary role is that of a

   (1) Solvent (2) Catalyst (3) Heat sink (4) Stabilizer

3. As a result of tension annealing of thermoplastic fibers :

   (1) Crystaline orientation decreases

   (2) Elongation break does not change Sonic modulus increases

   (3) Melting point decreases

   (4) Sonic modulus increases

4. Polycondensation reaction typically occurs due to the presence of :

   (1) One functional group (2) Two functional groups

   (3) Low temperature (4) Addition of a compound

5. The technique used for producing viscose rayon is :

   (1) Melt spinning (2) Wet spinning (3) Dry spinning (4) Dry-jet spinning

6. Which of the following is a leaf fiber

   (1) Sisal (2) Flax (3) Ramie (4) Banana

7. High elastic recovery of wool is predominately a result of :

   (1) Crystaline linkages (2) Deformation of amorphous regions

   (3) Percent crystalline (4) α-β transformation

8. The breaking extension of flax, cotton, jute and wool at standard testing atmosphere in the decreasing order is :

   (1) Wool > Jute > Cotton > Flax (2) Wool > Cotton > Jute > Flax

   (3) Wool > Jute > Flax > Cotton (4) Wool > Cotton > Flax > Jute

9. Shrinkage of cotton fabric during wetting is caused by :

   (1) Extension of fiber (2) Crimping of fiber

   (3) Swelling of fiber (4) Compression of fiber

10. Which of the following amino acids are responsible for relatively higher wet strength of the wool fiber ?

(1) Sericin (2) Cystine (3) Tyrosine (4) Threonine

11. The fiber that contains nitrogen and sulfur is :

(1) Kevlar (2) Nylon 6 (3) Wool (4) Polyester

12. During crystallization of polyester :

(1) Heat evolved

(2) Heat is absorbed

(3) No exchange of heat

(4) Small molecules such as water is eliminated

13. Which of the following is liquid crystal spun fibre ?

(1) Kevlar (2) Polyester (3) Nylon (4) Glass

14. The structure of the Carbon fibre is :

(1) Turbostratic structure (2) Graphitic structure

(3) Honey-comb structure (4) Flexible structure

15. The optical birefringence of glass fibre is :

(1) Zero (2) Negative (3) Positive (4) Infinity

16. Glass transition temperature is called :

(1) First order transition temperature (2) Second order transition temperature

(3) Third order transition temperature (4) Fourth order transition temperature

17. Which of the fibres - Nomex, Kevlar, PBO (Polybenzoxazole), Spectra - has highest LOI value ?

(1) Nomex (2) Kevlar (3) PBO (4) Spectra

18. In melt spinning of polyethylene terephthalate, pre drying of polymer chips is essential to avoid :

(1) Oxidative degradation (2) Thermal degradation

(3) Hydrolytic degradation (4) Higher production

19. The cross-section of a spinneret used for the production of hollow fiber is :

(1) Rectangular (2) Triangular

(3) Annular concentric (4) C-shaped

20. Acrylic fiber has high glass transition temperature primarily due to :

(1) Presence of bulky side groups (2) Presence of polar side groups

(3) Main chain stiffness (4) High crystallinity

21. Forward as well as reverse rotary motion in cotton combing is given to :

(1) Feed roller (2) Cylinder comb

(3) Detaching roller (4) Drawing rollers in comber draw box

22. What is the noil percentage (according to Gegauff's theory) for a comber with forward feed, given that the detaching roller setting is 15 mm, the length of feed per combing cycle is 6 mm, and the longest fiber length is 30 mm ?

(1) 49 (2) 30 (3) 16 (4) 9

23. Drawing and doubling operations on draw-frame are mainly used to :

(1) Improve short- and medium-term variation in silver

(2) Improve long term variation in sliver

(3) Improve sliver strength

(4) Make the sliver finer

24. What would be the CV of the resultant sliver if eight ends of slivers, each having a CV of 6%, are doubled and drawn to produce a sliver of the same hank, and the draw frame introduces an additional 2.12% CV ?

(1) 12 (2) 9 (3) 6 (4) 3

25. The permissible minimum angle of lead is 30 degrees. For a ring of 40 mm diameter, the minimum bobbin diameter in mm is :

(1) 15 (2) 18 (3) 20 (4) 22

26. The increase in traveler weight leads to an increase in :

(1) Yarn Tension (2) Yarn Twist (3) Traveler Lag (4) Balloon Diameter

27. Softer cots on drafting rollers results in :

(1) An increase drafting wave (2) Less fiber slippage at roller nip

(3) Change in draft (4) Reduced roller lapping

28. The winding speed (difference between the bobbin speed and traveler speed) of yarn in ring frame is 200 rpm when the bobbin diameter is 28 mm. If the bobbin diameter is increased to 35 mm, the winding speed (rpm) would be :

(1) 200 (2) 180 (3) 160 (4) 140

29. The maximum yarn tension in ring frame is typically observed at :

(1) Between the lappet guide and front roller

(2) Where the ballon radius is the maximum

(3) In the winding zone

(4) Just below the lappet guide

30. For a given yarn fineness, use of light ring traveler gives :

(1) Small ballon size but more yarn content on the bobbin

(2) Small ballon size but less yarn content on the bobbin

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(4) Big ballon size but less yarn content on the bobbin

31. The rotor spun yarn has better uniformity than the ring spun yarn of same count and same fibers. The reason is :

(1) The high production rate of rotor spinning system

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35. In air-jet spinning machine, P1 and P2 are the supply air pressure at rear nozzle (entryside) and the front nozzle (delivery side) respectively. The relationship between the P1 and P2 is :

(1) P1>P2 (2) P1<P2 (3) P1 = P2 (4) P1≥P2

36. The direct twist factor of a single 29.5 tex P/V yarn is 38.28 tpcm X $tex^{1/2}$. To keep twist per unit length the same, the indirect cotton twist multiplier (tpi / $Ne^{1/2}$) of 30 Ne cotton yarn will be approximately :

(1) 2.95 (2) 3.27 (3) 2.27 (4) 3.83

37. With an increase of draft, the drafting force :

(1) Increases (2) Decreases

(3) Decreases and then level off (4) Increases and then decreases

38. The length of 20 Tex cotton yarn in kilometer on a 2 kg cone will be :

(1) 50 (2) 100 (3) 150 (4) 200

39. The following has the highest index of irregularity :

(1) Carded sliver (2) Roving (3) Yarn (4) Drawn sliver

40. In a friction spinning, the diameter of the perforated drum and the average yarn tail diameter resting on the drum are 40 mm and 0.18 mm respectively. The drum and yarn delivery speed are 400 rpm and 250m/min respectively. If the slippage of the drum is 80% then the false twist per meter produced in the yarn at the friction drum is :

(1) 650 (2) 711 (3) 750 (4) 780

41. What is the time, in minutes, required to produce a 1.5 kg cone on a winding machine operating at a winding speed of 1000 m/min with 90% efficiency, given that the yarn has a linear density of 12 tex ?

(1) 131.7 (2) 138.8 (3) 143.2 (4) 147.5

42. Which of the following parameters does change with package build-up in case of a drum driven winding machine ?

(1) Winding speed (2) Coil Angle (3) Wind angle (4) Traverse ratio

43. With time, the wind per double traverse in a drum-driven winder :

(1) Increases (2) Decreases

(3) Don't change (4) First increases then decreases

44. Increase in the taper angle on a sectional warping machine will require :

(1) Increase in the traverse speed (2) Decrease in the traverse speed

(3) No change in the traverse speed (4) Increase in the winding speed

45. Ball warping is mostly preferred for :

(1) Terry towel (2) Narrow fabric (3) Denim (4) Poplin

46. 100 kg oven dry warp sized to a size add on of 8% and dried to an overall moisture content of 10% would finally weight (approximate) :

(1) 108 (2) 120 (3) 162 (4) 226

47. Size add on does not depend upon :

(1) Roller hardness (2) Drying cylinder temperature

(3) Size paste concentration (4) Machine speed

48. Limitations to the weft insertion rate of a plain shuttle loom is imposed by :

(1) The loom eccentricity (2) The picking and checking system

(3) The width of the loom (4) The mass of the slay

49. For a two fold increase in reed width, the picking power of a shuttle loom will increase by :

(1) 2 times (2) 4 times (3) 8 times (4) 16 times

50. If the diameter of a torsion rod used in projectile loom is doubled then the torque required to twist would increase by :

(1) 2 times (2) 4 times (3) 8 times (4) 16 times

51. In an air-jet loom :

(1) All the relay nozzles start jetting at the same time

(2) Each relay nozzle has separate jetting time

(3) Relay nozzles of a group start jetting at the same time

(4) Main and relay nozzles have the same jetting time

52. In a projectile loom, the projectile travels 250 cm at an average velocity of 25 m/s. If the weft insertion angle is 180 degrees, the maximum loom speed in picks per minute is :

(1) 300 (2) 320 (3) 340 (4) 360

53. A perpendicular laid non-woven :

(1) Should not contain thermoplastic fiber

(2) Does not form a 3-D structure

(3) Can't be used as replacement foam

(4) Exhibits high recovery from compression

54. The non-woven process which has the highest production rate is :

(1) Needle punching (2) Hydroentangling

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55. If the wale constant and course constant for a knitted fabrics are 4.2 and 5.46 respectively, then the value of the loop shape factor is approximately :

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56. The peak of the weaving tension is observed during :

(1) Shedding (2) Picking (3) Beat-up (4) Let-off

57. A yarn is unraveled from a woven fabric specimen of 1 m × 1 m size. If the length of the straightened yarn is 1.1 m, then the crimp percentage (in integer) is :

(1) 5 (2) 10 (3) 20 (4) 24

58. The crimp of a square fabric in which the thread spacing is equal to the yarn diameter without jamming will be (nearest integer) :

(1) 36% (2) 46% (3) 56% (4) 65%

59. If the warp and weft fractional cover are each 0.5, then the fabric fractional cover is :

(1) 0.55 (2) 0.65 (3) 0.75 (4) 0.85

60. A shuttle loom is running at 180 picks per minute. The angular velocity of the crank shaft in degrees/second is :

(1) 1000 (2) 1080 (3) 1160 (4) 1240

61. If the diameter of a fiber is d, its flexural rigidity is proportional to :

(1) d (2) d^2 (3) d^4 (4) d^8

62. Which one of the following fiber properties corelates the best with handle of fabric :

(1) Initial modulus (2) Yield stress

(3) Tenacity at break (4) Elongation at break

63. In stelometer, if F is the force acting on a fiber bundle and θ is the angle through which the pendulum is moved, then F is directly proportional to :

(1) Sin θ (2) Cos θ (3) Tan θ (4) Cot θ

64. The vibroscope method for the determination of fiber fineness does not take into account.

(1) Length of specimen

(2) Natural frequency of specimen

(3) Tension in specimen

(4) Tensile strength of specimen

65. The breaking strength load of a 300 mtex fiber is 110 mN. If the density of the fiber is $1.24 g/cm^3$, approximate breaking stress in kN/cm^2 is :

(1) 45.4 (2) 44.4 (3) 43.4 (4) 40.4

66. The tensile testers with strain gauge transducer rely on :

(1) Constant Rate of Traverse principle

(2) Constant Rate of Loading principle

(3) Constant Rate of Extension principle

(4) Pendulum lever principle

67. Hairiness module of Uster hairiness tester works on :

(1) Impedance principle (2) Electrical resistance principle

(3) Capacitance principle (4) Light scattering principle

68. In cantilever bending princlple, bending length equals overhanging length (in degrees) :

(1) When θ = 7.1 (2) When θ = 20.2

(3) When θ = 30.3 (4) When θ = 40.4

69. Creep of a fibre is measured under :

(1) Constant load (2) Constant stretch

(3) Constant load and stretch (4) Variable load

70. Based on the analysis of a triangular comb sorter diagram, if 30% of fibers can be regarded as short fibers, then the percentage of fibers by. weight which should be removed at comber to obtain yarn free of short fiber is :

(1) 9 (2) 10 (3) 18 (4) 30

71. In textile testing for a certain property the sample size is proportional to :

(1) CV^2 (2) CV

(3) $CV^{0.5}$ (4) CV^3

72. In the case of cotton, AFIS can be used to measure :

(1) Convolutions per unit length (2) Maturity

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73. The thinnest classimat fault among the followings is :

(1) D4 (2) E (3) F (4) 12

74. The value of breaking length in km (RKM) of a yarn is numerically equal to :

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75. The drape of a fabric is influenced by the most by :

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76. The shear characteristics of a fabric is measured by :

(1) KES-FB3 (2) FAST-3 (3) KES-FB2 (4) FAST-2

77. The areal density of a woven fabric is 150 gm/m^2 and the bending length in the warp direction is 3cm, then its flexural rigidity in gm.cm is :

(1) 0.405 (2) 4.050 (3) 4.500 (4) 4500.0

78. Pilling propensity on fabric surface increased with :

(1) Increase in length of fiber used in the yarn

(2) Increase in yarn twist

(3) Decrease in inter fibre friction

(4) Decrease in fiber strength

79. The abrasion cycles on a flat abrasion tester increase with an increase in :
(1) Pressure applied during abrasion (2) Speed of abrasion
(3) Area of abraded surface (4) Specimen tension during abrasion

80. The standard time to break a specimen on a tensile tester under Constant Rate of Loading conditions is :
(1) 15±3 sec (2) 20 ± 3 sec (3) 25 ± 3 sec (4) 30 ± 3 sec

81. During the bleaching of cotton with H_2O_2, the stabilizer used is :
(1) Sodium Hydroxide (2) Sodium Silicate
(3) Acetic acid (4) Sodium Carbonate

82. Cellulase is used for :
(1) Desizing
(2) Reducing surface tension of the wash liquor
(3) Removing protenious impurities during scouring
(4) Bio-polishing of cotton fabrics

83. Shrinkage observed in cotton yarn after mercerization is a result of :
(1) Decreased diameter of fibers (2) Decreased length of fibers
(3) Increased diameter of fibers (4) Increased diameter of fibers

84. Jet dyeing machines are built to be used with material to liquor ratio of :
(1) 1: 1 (2) 1:50 (3) 1 :30 (4) 1: 8

85. The cationic dyes are commonly used for :
(1) Cotton (2) Nylon (3) Polyester (4) Acrylic

86. With an increase in the concentration of the wetting agent the surface tension of the scouring solution would :
(1) Decrease
(2) Increase
(3) Decrease initially and then increase
(4) Decrease initially and then level off

87. Bifunctional reactive dyes are characterized by :
(1) High affinity, high reactivity (2) Low affinity, high reactivity
(3) High affinity, low reactivity (4) Low affinity, low reactivity

88. The dye bath of solubilized vat dyes has :
(1) Alkaline pH (2) Neutral pH (3) Acidic pH (4) Reducing nature

89. Sublimation transfer printing is preferred for :
(1) Polyester (2) Wool (3) Cotton (4) Acrylic

90. The most preferred thickener for the print paste for the pigment printing in cotton :
(1) Sodium Alginate (2) Emulsion
(3) Starch (4) Modified cellulose

91. Resistive printing on fabric under reactive dyes is carried out at :
(1) pH 4-5 (2) pH 7 (3) pH 10-11 (4) pH 14

92. Soil release finishes are most effective on :
(1) Cotton (2) Jute (3) Viscose (4) Polyester

93. Tetrakis (hydroxymethyl) phophonium chloride (THPC) is a :
(1) Softener (2) Carrier
(3) Leveling agent (4) Flame retardant

94. Disperse dye can't generally be fixed on polyester by :
(1) Super-heated steam at 180°C
(2) Saturated steam at 130°C
(3) Dry heat at 200°C
(4) Saturated steam at 100°C

95. The process to obtain dimension stability in synthetic textiles is :
(1) Milling
(2) Carbonizing
(3) Heat Setting
(4) Sanforizing

96. DMDHEU (Dimethylol dihydroxy ethylene urea) is used as :

(1) Flame retardant

(2) Crease-resist agent

(3) Softener

(4) Soil repellent

97. Liquid Ammonia treatment is alternative to process of :

(1) Mercerization

(3) Bleaching

(2) Scouring

(4) Singeing

98. The anti-crease finish is applied on cotton fabric with 3% on the weight of fabric (owf). What would be the concentration of finish required in padding bath % (weight /weight), if the wet pick-up is 80% and the specific gravity of the solution is 1.2 ?

(1) 3.125 (2) 4.125 (3) 3.75 (4) 4.5

99. The application of reactive dye was carried out on 100 gm cotton fabric with 2% shade using exhaustion method. The reactive dye is having 75% exhaustion and the reactivity of the dye is 85%. Then calculate the amount of dye unreacted.

(1) 0.225 gm (2) 0.3 gm (3) 0.5 gm (4) 0.725 gm

100. The most suitable dye combination for dyeing of wool/acrylic blend is

(1) Acid/Reactive (2) Acid/Basic

(3) Metal-complex/Direct (4) Reactive/Disperse

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(1) P1>P2 (2) P1<P2 (3) P1 = P2 (4) P1≥P2

26. The direct twist factor of a single 29.5 tex P/V yarn is 38.28 tpcm X tex$^{1/2}$. To keep twist per unit length the same, the indirect cotton twist multiplier (tpi / Ne$^{1/2}$) of 30 Ne cotton yarn will be approximately :

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28. The length of 20 Tex cotton yarn in kilometer on a 2 kg cone will be :

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(1) Carded sliver (2) Roving (3) Yarn (4) Drawn sliver

30. In a friction spinning, the diameter of the perforated drum and the average yarn tail diameter resting on the drum are 40 mm and 0.18 mm respectively. The drum and yarn delivery speed are 400 rpm and 250m/min respectively. If the slippage of the drum is 80% then the false twist per meter produced in the yarn at the friction drum is :

(1) 650 (2) 711 (3) 750 (4) 780

31. The fiber that contains nitrogen and sulfur is :

(1) Kevlar (2) Nylon 6 (3) Wool (4) Polyester

32. During crystallization of polyester :

(1) Heat evolved

(2) Heat is absorbed

(3) No exchange of heat

(4) Small molecules such as water is eliminated

33. Which of the following is liquid crystal spun fibre ?

(1) Kevlar (2) Polyester (3) Nylon (4) Glass

34. The structure of the Carbon fibre is :

(1) Turbostratic structure (2) Graphitic structure

(3) Honey-comb structure (4) Flexible structure

35. The optical birefringence of glass fibre is :

(1) Zero (2) Negative (3) Positive (4) Infinity

36. Glass transition temperature is called :

(1) First order transition temperature (2) Second order transition temperature

(3) Third order transition temperature (4) Fourth order transition temperature

37. Which of the fibres - Nomex, Kevlar, PBO (Polybenzoxazole), Spectra - has highest LOI value ?

(1) Nomex (2) Kevlar (3) PBO (4) Spectra

38. In melt spinning of polyethylene terephthalate, pre drying of polymer chips is essential to avoid :

(1) Oxidative degradation (2) Thermal degradation

(3) Hydrolytic degradation (4) Higher production

39. The cross-section of a spinneret used for the production of hollow fiber is :

(1) Rectangular (2) Triangular

(3) Annular concentric (4) C-shaped

40. Acrylic fiber has high glass transition temperature primarily due to :

(1) Presence of bulky side groups (2) Presence of polar side groups

(3) Main chain stiffness (4) High crystallinity

41. Resistive printing on fabric under reactive dyes is carried out at :

(1) pH 4-5 (2) pH 7 (3) pH 10-11 (4) pH 14

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(1) Cotton (2) Jute (3) Viscose (4) Polyester

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(2) Crease-resist agent
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(2) Scouring (4) Singeing

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(1) Acid/Reactive (2) Acid/Basic
(3) Metal-complex/Direct (4) Reactive/Disperse

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(1) d (2) d^2 (3) d^4 (4) d^8

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(1) Initial modulus (2) Yield stress
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(1) When $\theta = 7.1$ (2) When $\theta = 20.2$

(3) When $\theta = 30.3$ (4) When $\theta = 40.4$

59. Creep of a fibre is measured under :

(1) Constant load (2) Constant stretch

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60. Based on the analysis of a triangular comb sorter diagram, if 30% of fibers can be regarded as short fibers, then the percentage of fibers by. weight which should be removed at comber to obtain yarn free of short fiber is :

(1) 9 (2) 10 (3) 18 (4) 30

61. During the bleaching of cotton with H_2O_2, the stabilizer used is :

(1) Sodium Hydroxide (2) Sodium Silicate

(3) Acetic acid (4) Sodium Carbonate

62. Cellulase is used for :

(1) Desizing

(2) Reducing surface tension of the wash liquor

(3) Removing protenious impurities during scouring

(4) Bio-polishing of cotton fabrics

63. Shrinkage observed in cotton yarn after mercerization is a result of :
(1) Decreased diameter of fibers (2) Decreased length of fibers
(3) Increased diameter of fibers (4) Increased diameter of fibers

64. Jet dyeing machines are built to be used with material to liquor ratio of :
(1) 1: 1 (2) 1:50 (3) 1 :30 (4) 1: 8

65. The cationic dyes are commonly used for :
(1) Cotton (2) Nylon (3) Polyester (4) Acrylic

66. With an increase in the concentration of the wetting agent the surface tension of the scouring solution would :
(1) Decrease
(2) Increase
(3) Decrease initially and then increase
(4) Decrease initially and then level off

67. Bifunctional reactive dyes are characterized by :
(1) High affinity, high reactivity (2) Low affinity, high reactivity
(3) High affinity, low reactivity (4) Low affinity, low reactivity

68. The dye bath of solubilized vat dyes has :
(1) Alkaline pH (2) Neutral pH (3) Acidic pH (4) Reducing nature

69. Sublimation transfer printing is preferred for :
(1) Polyester (2) Wool (3) Cotton (4) Acrylic

70. The most preferred thickener for the print paste for the pigment printing in cotton :
(1) Sodium Alginate (2) Emulsion
(3) Starch (4) Modified cellulose

71. What is the time, in minutes, required to produce a 1.5 kg cone on a winding machine operating at a winding speed of 1000 m/min with 90% efficiency, given that the yarn has a linear density of 12 tex ?
(1) 131.7 (2) 138.8 (3) 143.2 (4) 147.5

72. Which of the following parameters does change with package build-up in case of a drum driven winding machine ?
(1) Winding speed (2) Coil Angle (3) Wind angle (4) Traverse ratio

73. With time, the wind per double traverse in a drum-driven winder :

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74. Increase in the taper angle on a sectional warping machine will require :

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(1) The loom eccentricity (2) The picking and checking system

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81. Forward as well as reverse rotary motion in cotton combing is given to :

(1) Feed roller (2) Cylinder comb

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82. What is the noil percentage (according to Gegauff's theory) for a comber with forward feed, given that the detaching roller setting is 15 mm, the length of feed per combing cycle is 6 mm, and the longest fiber length is 30 mm ?

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83. Drawing and doubling operations on draw-frame are mainly used to :

(1) Improve short- and medium-term variation in silver

(2) Improve long term variation in sliver

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84. What would be the CV of the resultant sliver if eight ends of slivers, each having a CV of 6%, are doubled and drawn to produce a sliver of the same hank, and the draw frame introduces an additional 2.12% CV ?

(1) 12 (2) 9 (3) 6 (4) 3

85. The permissible minimum angle of lead is 30 degrees. For a ring of 40 mm diameter, the minimum bobbin diameter in mm is :

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86. The increase in traveler weight leads to an increase in :

(1) Yarn Tension (2) Yarn Twist (3) Traveler Lag (4) Balloon Diameter

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88. The winding speed (difference between the bobbin speed and traveler speed) of yarn in ring frame is 200 rpm when the bobbin diameter is 28 mm. If the bobbin diameter is increased to 35 mm, the winding speed (rpm) would be :

(1) 200 (2) 180 (3) 160 (4) 140

89. The maximum yarn tension in ring frame is typically observed at :

(1) Between the lappet guide and front roller

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Total No. of Printed Pages : 13

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C

SET-X

Ph.D-EE-December, 2024
Textile Engineering

10003

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

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_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. ***All questions are compulsory.***
2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There shall be negative marking. A deduction of 0.25 marks shall be there for each wrong answer. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

SEAL

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(1) The high production rate of rotor spinning system
(2) The fiber doubling occurs inside the rotor
(3) The presence of wrapper fibers in rotor spun yarns
(4) Twisting and winding is taken place in rotor spinning

52. In case of a bobbin leading roving frame :
(1) Spindle rpm remains constant
(2) Bobbin rpm remains constant
(3) Both spindle and bobbin rpm vary
(4) Both spindle and bobbin rpm remain constant

53. The length and breadth of working area of a flat is 100 cm and 25 mm respectively. The tooth density is 200 per inch^2. The number of teeth on a flat is close to :

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(1) 650 (2) 711 (3) 750 (4) 780

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(1) D4 (2) E (3) F (4) 12

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67. The areal density of a woven fabric is 150 gm/m^2 and the bending length in the warp direction is 3cm, then its flexural rigidity in gm.cm is :

(1) 0.405 (2) 4.050 (3) 4.500 (4) 4500.0

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(2) Increase in yarn twist

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74. Jet dyeing machines are built to be used with material to liquor ratio of :

(1) 1: 1 (2) 1:50 (3) 1 :30 (4) 1: 8

75. The cationic dyes are commonly used for :

(1) Cotton (2) Nylon (3) Polyester (4) Acrylic

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(1) Decrease

(2) Increase

(3) Decrease initially and then increase

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77. Bifunctional reactive dyes are characterized by :

(1) High affinity, high reactivity (2) Low affinity, high reactivity

(3) High affinity, low reactivity (4) Low affinity, low reactivity

78. The dye bath of solubilized vat dyes has :

(1) Alkaline pH (2) Neutral pH (3) Acidic pH (4) Reducing nature

79. Sublimation transfer printing is preferred for :

(1) Polyester (2) Wool (3) Cotton (4) Acrylic

80. The most preferred thickener for the print paste for the pigment printing in cotton :

(1) Sodium Alginate (2) Emulsion

(3) Starch (4) Modified cellulose

81. The fiber that contains nitrogen and sulfur is :

(1) Kevlar (2) Nylon 6 (3) Wool (4) Polyester

82. During crystallization of polyester :

(1) Heat evolved

(2) Heat is absorbed

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(4) Small molecules such as water is eliminated

83. Which of the following is liquid crystal spun fibre ?

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86. Glass transition temperature is called :

(1) First order transition temperature (2) Second order transition temperature

(3) Third order transition temperature (4) Fourth order transition temperature

87. Which of the fibres - Nomex, Kevlar, PBO (Polybenzoxazole), Spectra - has highest LOI value ?

(1) Nomex (2) Kevlar (3) PBO (4) Spectra

88. In melt spinning of polyethylene terephthalate, pre drying of polymer chips is essential to avoid :

(1) Oxidative degradation (2) Thermal degradation

(3) Hydrolytic degradation (4) Higher production

89. The cross-section of a spinneret used for the production of hollow fiber is :

(1) Rectangular (2) Triangular

(3) Annular concentric (4) C-shaped

90. Acrylic fiber has high glass transition temperature primarily due to :

(1) Presence of bulky side groups

(2) Presence of polar side groups

(3) Main chain stiffness

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91. In an air-jet loom :

(1) All the relay nozzles start jetting at the same time

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(1) Needle punching (2) Hydroentangling

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97. A yarn is unraveled from a woven fabric specimen of 1 m × 1 m size. If the length of the straightened yarn is 1.1 m, then the crimp percentage (in integer) is :

(1) 5 (2) 10 (3) 20 (4) 24

98. The crimp of a square fabric in which the thread spacing is equal to the yarn diameter without jamming will be (nearest integer) :

(1) 36% (2) 46% (3) 56% (4) 65%

99. If the warp and weft fractional cover are each 0.5, then the fabric fractional cover is :

(1) 0.55 (2) 0.65 (3) 0.75 (4) 0.85

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Total No. of Printed Pages : 13

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SET-X

D

Ph.D-EE-December, 2024
Textile Engineering

10004

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

Date of Examination _____

_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. ***All questions are compulsory.***
2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There shall be negative marking. A deduction of 0.25 marks shall be there for each wrong answer. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

SEAL

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11. Resistive printing on fabric under reactive dyes is carried out at :
(1) pH 4-5 (2) pH 7 (3) pH 10-11 (4) pH 14

12. Soil release finishes are most effective on :
(1) Cotton (2) Jute (3) Viscose (4) Polyester

13. Tetrakis (hydroxymethyl) phophonium chloride (THPC) is a :
(1) Softener (2) Carrier
(3) Leveling agent (4) Flame retardant

14. Disperse dye can't generally be fixed on polyester by :
(1) Super-heated steam at 180°C
(2) Saturated steam at 130°C
(3) Dry heat at 200°C
(4) Saturated steam at 100°C

15. The process to obtain dimension stability in synthetic textiles is :
(1) Milling
(2) Carbonizing
(3) Heat Setting
(4) Sanforizing

16. DMDHEU (Dimethylol dihydroxy ethylene urea) is used as :
(1) Flame retardant (2) Crease-resist agent
(3) Softener (4) Soil repellent

17. Liquid Ammonia treatment is alternative to process of :
(1) Mercerization
(3) Bleaching
(2) Scouring
(4) Singeing

18. The anti-crease finish is applied on cotton fabric with 3% on the weight of fabric (owf). What would be the concentration of finish required in padding bath % (weight /weight), if the wet pick-up is 80% and the specific gravity of the solution is 1.2 ?

(1) 3.125 (2) 4.125 (3) 3.75 (4) 4.5

19. The application of reactive dye was carried out on 100 gm cotton fabric with 2% shade using exhaustion method. The reactive dye is having 75% exhaustion and the reactivity of the dye is 85%. Then calculate the amount of dye unreacted.

(1) 0.225 gm (2) 0.3 gm (3) 0.5 gm (4) 0.725 gm

20. The most suitable dye combination for dyeing of wool/acrylic blend is

(1) Acid/Reactive (2) Acid/Basic

(3) Metal-complex/Direct (4) Reactive/Disperse

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(1) 1000 (2) 1080 (3) 1160 (4) 1240

41. The rotor spun yarn has better uniformity than the ring spun yarn of same count and same fibers. The reason is :
(1) The high production rate of rotor spinning system
(2) The fiber doubling occurs inside the rotor
(3) The presence of wrapper fibers in rotor spun yarns
(4) Twisting and winding is taken place in rotor spinning

42. In case of a bobbin leading roving frame :
(1) Spindle rpm remains constant
(2) Bobbin rpm remains constant
(3) Both spindle and bobbin rpm vary
(4) Both spindle and bobbin rpm remain constant

43. The length and breadth of working area of a flat is 100 cm and 25 mm respectively. The tooth density is 260 per inch^2. The number of teeth on a flat is close to :
(1) 100750 (2) 8569 (3) 10075 (4) 7690

44. Compared to the spinning of finer cotton yarns, the preferred rotor diameter for the roduction of very coarse cotton yarns would be :
(1) Higher (2) Lower
(3) No change (4) Changes as per fiber strength

45. In air-jet spinning machine, P1 and P2 are the supply air pressure at rear nozzle (entryside) and the front nozzle (delivery side) respectively. The relationship between the P1 and P2 is :

(1) P1>P2 (2) P1<P2 (3) P1 = P2 (4) P1≥P2

46. The direct twist factor of a single 29.5 tex P/V yarn is 38.28 tpcm X $tex^{1/2}$. To keep twist per unit length the same, the indirect cotton twist multiplier (tpi / $Ne^{1/2}$) of 30 Ne cotton yarn will be approximately :

(1) 2.95 (2) 3.27 (3) 2.27 (4) 3.83

47. With an increase of draft, the drafting force :

(1) Increases (2) Decreases

(3) Decreases and then level off (4) Increases and then decreases

48. The length of 20 Tex cotton yarn in kilometer on a 2 kg cone will be :

(1) 50 (2) 100 (3) 150 (4) 200

49. The following has the highest index of irregularity :

(1) Carded sliver (2) Roving (3) Yarn (4) Drawn sliver

50. In a friction spinning, the diameter of the perforated drum and the average yarn tail diameter resting on the drum are 40 mm and 0.18 mm respectively. The drum and yarn delivery speed are 400 rpm and 250m/min respectively. If the slippage of the drum is 80% then the false twist per meter produced in the yarn at the friction drum is :

(1) 650 (2) 711 (3) 750 (4) 780

51. Forward as well as reverse rotary motion in cotton combing is given to :

(1) Feed roller (2) Cylinder comb

(3) Detaching roller (4) Drawing rollers in comber draw box

52. What is the noil percentage (according to Gegauff's theory) for a comber with forward feed, given that the detaching roller setting is 15 mm, the length of feed per combing cycle is 6 mm, and the longest fiber length is 30 mm ?

(1) 49 (2) 30 (3) 16 (4) 9

53. Drawing and doubling operations on draw-frame are mainly used to :

(1) Improve short- and medium-term variation in silver

(2) Improve long term variation in sliver

(3) Improve sliver strength

(4) Make the sliver finer

54. What would be the CV of the resultant sliver if eight ends of slivers, each having a CV of 6%, are doubled and drawn to produce a sliver of the same hank, and the draw frame introduces an additional 2.12% CV ?

(1) 12 (2) 9 (3) 6 (4) 3

55. The permissible minimum angle of lead is 30 degrees. For a ring of 40 mm diameter, the minimum bobbin diameter in mm is :

(1) 15 (2) 18 (3) 20 (4) 22

56. The increase in traveler weight leads to an increase in :

(1) Yarn Tension (2) Yarn Twist (3) Traveler Lag (4) Balloon Diameter

57. Softer cots on drafting rollers results in :

(1) An increase drafting wave
(2) Less fiber slippage at roller nip
(3) Change in draft
(4) Reduced roller lapping

58. The winding speed (difference between the bobbin speed and traveler speed) of yarn in ring frame is 200 rpm when the bobbin diameter is 28 mm. If the bobbin diameter is increased to 35 mm, the winding speed (rpm) would be :

(1) 200 (2) 180 (3) 160 (4) 140

59. The maximum yarn tension in ring frame is typically observed at :

(1) Between the lappet guide and front roller
(2) Where the ballon radius is the maximum
(3) In the winding zone
(4) Just below the lappet guide

60. For a given yarn fineness, use of light ring traveler gives :

(1) Small ballon size but more yarn content on the bobbin
(2) Small ballon size but less yarn content on the bobbin
(3) Big ballon size but more yarn content on the bobbin
(4) Big ballon size but less yarn content on the bobbin

61. What is the time, in minutes, required to produce a 1.5 kg cone on a winding machine operating at a winding speed of 1000 m/min with 90% efficiency, given that the yarn has a linear density of 12 tex ?

(1) 131.7 (2) 138.8 (3) 143.2 (4) 147.5

62. Which of the following parameters does change with package build-up in case of a drum driven winding machine ?

(1) Winding speed (2) Coil Angle (3) Wind angle (4) Traverse ratio

63. With time, the wind per double traverse in a drum-driven winder :

(1) Increases (2) Decreases
(3) Don't change (4) First increases then decreases

64. Increase in the taper angle on a sectional warping machine will require :

(1) Increase in the traverse speed (2) Decrease in the traverse speed
(3) No change in the traverse speed (4) Increase in the winding speed

65. Ball warping is mostly preferred for :

(1) Terry towel (2) Narrow fabric (3) Denim (4) Poplin

66. 100 kg oven dry warp sized to a size add on of 8% and dried to an overall moisture content of 10% would finally weight (approximate) :

(1) 108 (2) 120 (3) 162 (4) 226

67. Size add on does not depend upon :

(1) Roller hardness (2) Drying cylinder temperature
(3) Size paste concentration (4) Machine speed

68. Limitations to the weft insertion rate of a plain shuttle loom is imposed by :

(1) The loom eccentricity (2) The picking and checking system
(3) The width of the loom (4) The mass 'of the sley

69. For a two fold increase in reed width, the picking power of a shuttle loom will increase by :

(1) 2 times (2) 4 times (3) 8 times (4) 16 times

70. If the diameter of a torsion rod used in projectile loom is doubled then the torque required to twist would increase by :

(1) 2 times (2) 4 times (3) 8 times (4) 16 times

71. If the diameter of a fiber is d, its flexural rigidity is proportional to :

(1) d (2) d^2 (3) d^4 (4) d^8

72. Which one of the following fiber properties corelates the best with handle of fabric :

(1) Initial modulus (2) Yield stress
(3) Tenacity at break (4) Elongation at break

73. In stelometer, if F is the force acting on a fiber bundle and θ is the angle through which the pendulum is moved, then F is directly proportional to :

(1) Sin θ (2) Cos θ (3) Tan θ (4) Cot θ

74. The vibroscope method for the determination of fiber fineness does not take into account.

(1) Length of specimen

(2) Natural frequency of specimen

(3) Tension in specimen

(4) Tensile strength of specimen

75. The breaking strength load of a 300 mtex fiber is 110 mN. If the density of the fiber is 1.24g/cm^3, approximate breaking stress in kN/cm^2 is :

(1) 45.4 (2) 44.4 (3) 43.4 (4) 40.4

76. The tensile testers with strain gauge transducer rely on :

(1) Constant Rate of Traverse principle

(2) Constant Rate of Loading principle

(3) Constant Rate of Extension principle

(4) Pendulum lever principle

77. Hairiness module of Uster hairiness tester works on :

(1) Impedance principle (2) Electrical resistance principle

(3) Capacitance principle (4) Light scattering principle

78. In cantilever bending princlple, bending length equals overhanging length (in degrees) :

(1) When θ = 7.1 (2) When θ = 20.2

(3) When θ = 30.3 (4) When θ = 40.4

79. Creep of a fibre is measured under :

(1) Constant load (2) Constant stretch

(3) Constant load and stretch (4) Variable load

80. Based on the analysis of a triangular comb sorter diagram, if 30% of fibers can be regarded as short fibers, then the percentage of fibers by. weight which should be removed at comber to obtain yarn free of short fiber is :

(1) 9 (2) 10 (3) 18 (4) 30

81. Which fiber has the least density ?

(1) Polyester (2) Cotton (3) Viscose (4) Polypropylene

82. Water is added to caprolactam during the polymerization of Nylon 6. The primary role is that of a

(1) Solvent (2) Catalyst (3) Heat sink (4) Stabilizer

83. As a result of tension annealing of thermoplastic fibers :

(1) Crystaline orientation decreases

(2) Elongation break does not change Sonic modulus increases

(3) Melting point decreases

(4) Sonic modulus increases

84. Polycondensation reaction typically occurs due to the presence of :

(1) One functional group (2) Two functional groups

(3) Low temperature (4) Addition of a compound

85. The technique used for producing viscose rayon is :

(1) Melt spinning (2) Wet spinning (3) Dry spinning (4) Dry-jet spinning

86. Which of the following is a leaf fiber

(1) Sisal (2) Flax (3) Ramie (4) Banana

87. High elastic recovery of wool is predominately a result of :

(1) Crystaline linkages (2) Deformation of amorphous regions

(3) Percent crystalline (4) α-β transformation

88. The breaking extension of flax, cotton, jute and wool at standard testing atmosphere in the decreasing order is :

(1) Wool > Jute > Cotton > Flax (2) Wool > Cotton > Jute > Flax

(3) Wool > Jute > Flax > Cotton (4) Wool > Cotton > Flax > Jute

89. Shrinkage of cotton fabric during wetting is caused by :

(1) Extension of fiber (2) Crimping of fiber

(3) Swelling of fiber (4) Compression of fiber

90. Which of the following amino acids are responsible for relatively higher wet strength of the wool fiber ?

(1) Sericin (2) Cystine (3) Tyrosine (4) Threonine

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(3) High affinity, low reactivity (4) Low affinity, low reactivity

98. The dye bath of solubilized vat dyes has :

(1) Alkaline pH (2) Neutral pH (3) Acidic pH (4) Reducing nature

99. Sublimation transfer printing is preferred for :

(1) Polyester (2) Wool (3) Cotton (4) Acrylic

100. The most preferred thickener for the print paste for the pigment printing in cotton :

(1) Sodium Alginate (2) Emulsion

(3) Starch (4) Modified cellulose

Answer keys of PH.D (TEXTILE) entrance exam dated 05.12.2024				
Q. NO.	A	B	C	D
1	4	1	2	3
2	2	2	4	1
3	4	4	2	1
4	2	3	2	1
5	2	1	3	1
6	1	2	2	2
7	4	1	2	3
8	4	4	2	3
9	3	2	2	4
10	2	2	4	2
11	3	3	3	1
12	1	1	3	4
13	1	4	2	4
14	1	4	4	4
15	1	1	3	3
16	2	3	1	2
17	3	2	2	1
18	3	3	3	3
19	4	3	3	1
20	2	2	4	2
21	3	2	4	1
22	3	1	2	2
23	2	3	4	4
24	4	1	2	3
25	3	2	2	1
26	1	2	1	2
27	2	4	4	1
28	3	2	4	4
29	3	1	3	2
30	4	2	2	2
31	2	3	1	3
32	1	1	4	1
33	3	1	4	4
34	1	1	4	4
35	2	1	3	1
36	2	2	2	3
37	4	3	1	2
38	2	3	3	3
39	1	4	1	3
40	2	2	2	2
41	2	1	3	2
42	4	4	1	1
43	2	4	1	3
44	2	4	4	1
45	3	3	1	2
46	2	2	3	2
47	2	1	4	4
48	2	3	4	2
49	2	1	1	1
50	4	2	3	2

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Answer keys of PH.D (TEXTILE) entrance exam dated 05.12.2024				
Q. NO.	A	B	C	D
51	3	3	2	3
52	1	1	1	3
53	4	1	3	2
54	4	4	1	4
55	1	1	2	3
56	3	3	2	1
57	2	4	4	2
58	3	4	2	3
59	3	1	1	3
60	2	3	2	4
61	3	2	1	2
62	1	4	2	4
63	1	2	4	2
64	4	1	3	2
65	1	4	1	3
66	3	4	2	2
67	4	1	1	2
68	4	1	4	2
69	1	1	2	2
70	3	2	2	4
71	1	2	2	3
72	2	4	4	1
73	4	2	2	1
74	3	2	1	4
75	1	3	4	1
76	2	2	4	3
77	1	2	1	4
78	4	2	1	4
79	2	2	1	1
80	2	4	2	3
81	2	3	3	4
82	4	3	1	2
83	2	2	1	4
84	1	4	1	2
85	4	3	1	2
86	4	1	2	1
87	1	2	3	4
88	1	3	3	4
89	1	3	4	3
90	2	4	2	2
91	1	4	3	2
92	4	2	1	4
93	4	4	4	2
94	4	2	4	1
95	3	2	1	4
96	2	1	3	4
97	1	4	2	1
98	3	4	3	1
99	1	3	3	1
100	2	2	2	2

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