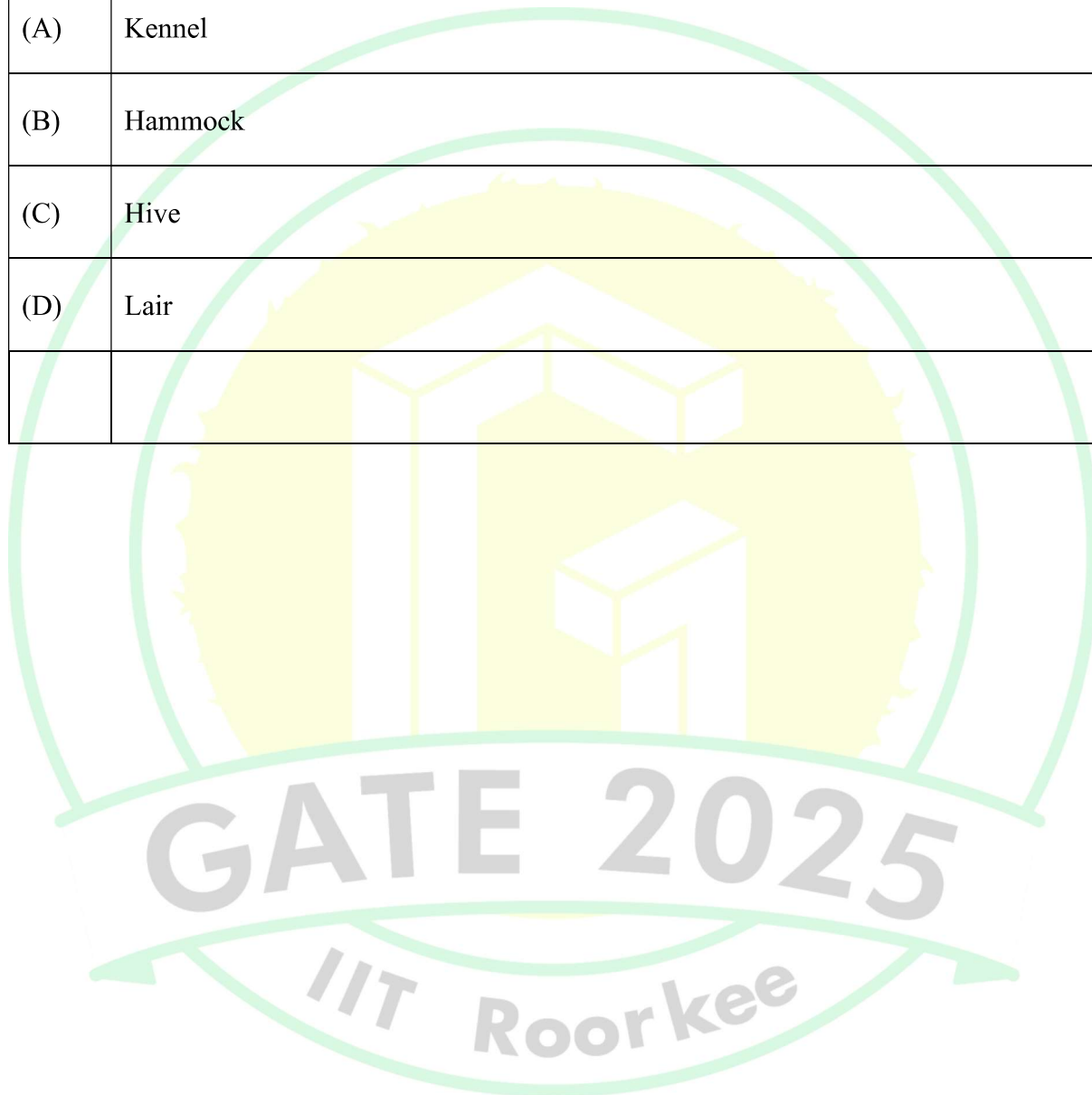# General Aptitude

Q.1 – Q.5 Carry ONE mark Each

Q.1	Despite his initial hesitation, Rehman's _____ to contribute to the success of the project never wavered. Select the most appropriate option to complete the above sentence.
(A)	ambivalence
(B)	satisfaction
(C)	resolve
(D)	revolve
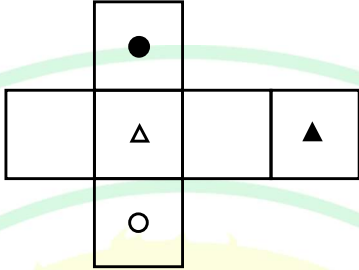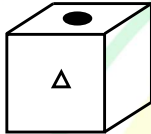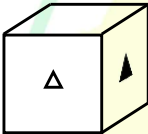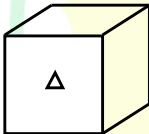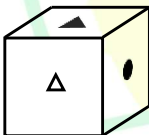
Q.2	Bird : Nest :: Bee : _____
	Select the correct option to complete the analogy.
(A)	Kennel
(B)	Hammock
(C)	Hive
(D)	Lair

Q.3	If $Pe^x = Qe^{-x}$ for all real values of x, which one of the following statements is true?
(A)	$P = Q = 0$
(B)	$P = Q = 1$
(C)	$P = 1; \ Q = -1$
(D)	$\dfrac{P}{Q} = 0$

Q.4	The paper as shown in the figure is folded to make a cube where each square corresponds to a particular face of the cube. Which one of the following options correctly represents the cube? Note: The figures shown are representative.

(A)	
(B)	
(C)	
(D)	

Q.5	Let p_1 and p_2 denote two arbitrary prime numbers. Which one of the following statements is correct for all values of p_1 and p_2?
(A)	$p_1 + p_2$ is not a prime number.
(B)	$p_1 p_2$ is not a prime number.
(C)	$p_1 + p_2 + 1$ is a prime number.
(D)	$p_1 p_2 + 1$ is a prime number.

Q.6 – Q.10 Carry TWO marks Each

Q.6	Based only on the conversation below, identify the logically correct inference: "Even if I had known that you were in the hospital, I would not have gone there to see you", Ramya told Josephine.
(A)	Ramya knew that Josephine was in the hospital.
(B)	Ramya did not know that Josephine was in the hospital.
(C)	Ramya and Josephine were once close friends; but now, they are not.
(D)	Josephine was in the hospital due to an injury to her leg.
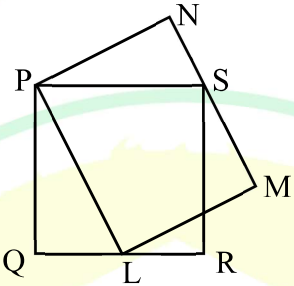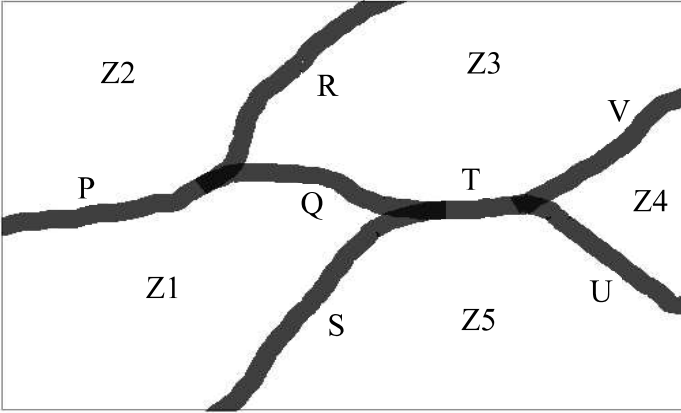
Q.7	If IMAGE and FIELD are coded as FHBNJ and EMFJG respectively then, which one among the given options is the most appropriate code for BEACH ?
(A)	CEADP
(B)	IDBFC
(C)	JGIBC
(D)	IBCEC

Q.8	Which one of the following options is correct for the given data in the table?

Iteration (i)	0	1	2	3
Input (I)	20	-4	10	15
Output (X)	20	16	26	41
Output (Y)	20	-80	-800	-12000

(A)	$X(i) = X(i-1) + I(i); \quad Y(i) = Y(i-1)I(i); \quad i > 0$
(B)	$X(i) = X(i-1)I(i); \quad Y(i) = Y(i-1) + I(i); \quad i > 0$
(C)	$X(i) = X(i-1)I(i); \quad Y(i) = Y(i-1)I(i); \quad i > 0$
(D)	$X(i) = X(i-1) + I(i); \quad Y(i) = Y(i-1)I(i-1); \quad i > 0$

Q.9	In the given figure, PQRS is a square of side 2 cm and PLMN is a rectangle. The corner L of the rectangle is on the side QR. Side MN of the rectangle passes through the corner S of the square. What is the area (in cm^2) of the rectangle PLMN? Note: The figure shown is representative.

(A)	$2\sqrt{2}$
(B)	2
(C)	8
(D)	4

Q.10	The diagram below shows a river system consisting of 7 segments, marked P, Q, R, S, T, U, and V. It splits the land into 5 zones, marked Z1, Z2, Z3, Z4, and Z5. We need to connect these zones using the least number of bridges. Out of the following options, which one is correct? Note: The figure shown is representative.

(A)	Bridges on P, Q, and T
(B)	Bridges on P, Q, S, and T
(C)	Bridges on Q, R, T, and V
(D)	Bridges on P, Q, S, U, and V

Q.11 – Q.35 Carry ONE mark Each

Q.11	The solution of the following differential equation represents
	$$\frac{dy}{dx} = \frac{y+1}{x}$$
(A)	a straight line
(B)	a parabola
(C)	an ellipse
(D)	a hyperbola
Q.12	If $\begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$ be the eigenvector of the matrix $\begin{bmatrix} 8 & 11 & 3 \\ 4 & -1 & 3 \\ -4 & 10 & 6 \end{bmatrix}$, then the corresponding eigenvalue is
(A)	-12
(B)	0
(C)	1
(D)	9

Q.13	The value of α for which the Euler method with step size $h = 0.1$ provides $y(1.1) = 1.2$ for the following initial value problem is
	$$\frac{dy}{dx} = -2xy^{\alpha}, \qquad y(1) = 2$$
(A)	-2
(B)	-1
(C)	1
(D)	2
Q.14	The fibre which does **NOT** contain 1,4-glycosidic bonds is
(A)	Polynosic
(B)	Lyocell
(C)	Silk
(D)	Ramie

Q.15	The fibre forming polymer which contains aromatic group in the main chain is
(A)	Poly(ethylene terephthalate)
(B)	Polypropylene
(C)	Polyacrylonitrile
(D)	Ultra-high molecular weight polyethylene
Q.16	The purpose of top comb in a cotton comber is to
(A)	remove the leading hooks
(B)	guide the fibre fringe to detaching rollers
(C)	control the fibre stream while piecing
(D)	straighten the trailing end of fibres

Q.17	Wider setting between cylinder and flat results in higher
(A)	fibre rupture
(B)	flat strips
(C)	neps in sliver
(D)	trailing hooks in sliver
Q.18	Profile reed is used in
(A)	Projectile loom
(B)	Rapier loom
(C)	Shuttle loom
(D)	Air-jet loom

Q.19	Amongst the following, the component which is **NOT** a part of single-bed warp knitting machine, is
(A)	Guide bar
(B)	Needle bar
(C)	Sinker
(D)	Heald shaft
Q.20	In fibrograph, 2.5% span length (*l*) means
(A)	2.5% of the fibres are shorter than *l*
(B)	2.5% of the fibres are longer than *l*
(C)	2.5% of the mean length
(D)	2.5% of the effective length

Q.21	High drape coefficient of fabric indicates
(A)	soft fabric
(B)	flexible fabric
(C)	stiff fabric
(D)	low strength fabric
Q.22	For dyeing of a polyester/cotton blended fabric in solid shade, the correct combination of dyes is
(A)	disperse and reactive
(B)	basic and reactive
(C)	acid and reactive
(D)	vat and basic

Q.23	Carbonization is a pretreatment process for
(A)	Cotton
(B)	Wool
(C)	Flax
(D)	Jute

Q.24	Amongst the following, the exothermic transition(s) is/are
(A)	glass transition
(B)	crystallization
(C)	melting
(D)	sublimation

Q.25	Amongst the following interface(s) in a carding machine, carding action takes place in
(A)	Feed roller and Licker-in
(B)	Licker-in and Cylinder
(C)	Cylinder and Doffer
(D)	Cylinder and Flats
Q.26	Cone winding machines equipped with electronic yarn clearers remove the following defect(s) from the spun yarn
(A)	imperfections
(B)	objectionable faults
(C)	long hairs
(D)	vegetable matters

Q.27	The parameter(s) required to convert load-elongation curve to stress-strain curve of a yarn is/are
(A)	initial linear density of yarn
(B)	linear density of yarn at break
(C)	gauge length of yarn
(D)	length of yarn at break
Q.28	Amongst the following, the chromophore(s) is/are
(A)	Anthraquinone
(B)	Azo
(C)	Phthalocyanine
(D)	Mono-chloro triazine

Q.29	Consider the partial differential equation
	$$\frac{\partial^2 u}{\partial x^2} = \frac{1}{k}\frac{\partial u}{\partial t} + \sin x, k > 0$$
	Amongst the following, the correct statement(s) for the above equation is/are
(A)	It is homogeneous
(B)	It is linear
(C)	It is of degree 1
(D)	It is of order 2

Q.30	The diameter of a fibre is assumed to be a continuous random variable (X) with probability density function
	$$f(x) = 6x(1 - x), 0 < x \leq 1$$
	If $P(X < \beta) = P(X > \beta)$, then the value of β (*rounded off to 1 decimal place*) is _____.
Q.31	In the first heating cycle of a differential scanning calorimetry (DSC) experiment, an as-spun Nylon 6 fibre showed an enthalpy change of 40 J/g during cold crystallization and an enthalpy change of 150 J/g during melting. If the heat of fusion of 100% crystalline Nylon 6 is 240 J/g, the percentage degree of crystallinity of as-spun Nylon 6 fibre (*rounded off to 1 decimal place*) is _____.

Q.32	A blowroom line has three beaters, each having a trash removal efficiency (cleaning index) of 30%. The trash removal efficiency (%) of the blowroom line (*rounded off to 1 decimal place*) is _____.
Q.33	A woven fabric has weft yarn of 24 tex and pick density of 25 per cm. It is desired to replace only the weft with a 6 tex yarn of same packing density. The pick density per cm required to keep the fabric cover same (*answer in integer*) is _____.
Q.34	The twist in a 36 Ne cotton yarn is 15 tpi. The twist multiplier (TM) in cotton system of the yarn (*correct to 1 decimal place*) is _____.
Q.35	The molarity (moles per litre) of 34% (w/v) H_2O_2 aqueous solution (*answer in integer*) is _____.

Q.36 – Q.65 Carry TWO marks Each

Q.36	A fibre of length l is to be divided into two pieces. Multiplying the square of the length of one piece with the cube of the length of other piece yields the greatest possible product value. Amongst the following, the correct combination of the lengths is
(A)	$\dfrac{2l}{5}$ and $\dfrac{3l}{5}$
(B)	$\dfrac{l}{4}$ and $\dfrac{3l}{4}$
(C)	$\dfrac{l}{3}$ and $\dfrac{2l}{3}$
(D)	$\dfrac{l}{2}$ and $\dfrac{l}{2}$
Q.37	For a textile industry, the revenue of selling x ton of yarn is $R(x) = 4x$ and the cost of producing x ton of yarn is $C(x) = 10 + 2x + 3x^{2/3}$. The industry decided to calculate the break-even (when revenue is equal to the cost) for x ton of yarn using Newton-Rapson method. Assuming the initial break-even of 8 ton, the break-even (ton) after the first iteration is
(A)	6
(B)	8
(C)	12
(D)	14

Q.38	Determine the correctness or otherwise of the following Assertion [p] and Reason [r]. [p]: The melting temperature of polyester (PET) fibres is higher than that of Nylon 6 fibres [r]: The hydrogen bonding in PET is stronger than that in Nylon 6
(A)	Both [p] and [r] are true and [r] is the correct reason for [p]
(B)	Both [p] and [r] are true but [r] is not the correct reason for [p]
(C)	Both [p] and [r] are false
(D)	[p] is true but [r] is false
Q.39	Determine the correctness or otherwise of the following Assertion [p] and Reason [r]. [p]: The tenacity of a polymeric fibre depends on the strain rate [r]: Under mechanical deformation polymeric fibre exhibits both elastic as well as viscous response
(A)	Both [p] and [r] are true and [r] is the correct reason for [p]
(B)	Both [p] and [r] are true but [r] is not the correct reason for [p]
(C)	Both [p] and [r] are false
(D)	[p] is true but [r] is false

Q.40	Group I indicates type of spun yarns and group II indicates yarn characteristics. Match the yarns with their characteristics.
	Group I Group II
	P. Ring 1. Yarn is stiff and has nearly twistless yarn core
	Q. Rotor 2. Yarn is strong and has helical structure
	R. Friction (open end) 3. Yarn is bulky and has wrapper fibres
	S. Air-jet 4. Yarn is bulky and has very poor fibre migration
(A)	P-3, Q-1, R-2, S-4
(B)	P-2, Q-3, R-4, S-1
(C)	P-2, Q-3, R-1, S-4
(D)	P-1, Q-2, R-3, S-4

Q.41	Amongst the following, the correct sequence of drives from main shaft to bobbins in a roving frame is
(A)	Main shaft $\rightarrow$ Twist change gears $\rightarrow$ Cone drums $\rightarrow$ Planetary gears $\rightarrow$ Bobbins
(B)	Main shaft $\rightarrow$ Draft change gears $\rightarrow$ Cone drums $\rightarrow$ Planetary gears $\rightarrow$ Bobbins
(C)	Main shaft $\rightarrow$ Draft change gears $\rightarrow$ Planetary gears $\rightarrow$ Cone drums $\rightarrow$ Bobbins
(D)	Main shaft $\rightarrow$ Twist change gears $\rightarrow$ Planetary gears $\rightarrow$ Cone drums $\rightarrow$ Bobbins

Q.42	Group I lists the components of the weaving machine and Group II lists their functions. Match the component with its function.

	Group I		Group II
P	Conjugate/matched cams	1	Driving the cloth roller with slip drive
Q	Worm and worm wheel	2	Continuous positive take up motion
R	Friction clutch device	3	Motion of sley in rapier loom
S	Lease rod	4	Separation of the warp sheet forming the shed

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

Q.43	A series of plain knitted fabrics has varying stitch length (ℓ). The fabrics are composed of cotton yarns having same packing density but differing in linear density (T). The ratio between tightness factor and areal density of the fabrics is proportional to
(A)	$$\frac{\ell^2}{\sqrt{T}}$$
(B)	$$\frac{1}{\ell^2\,\sqrt{T}}$$
(C)	$$\frac{\ell}{\sqrt{T}}$$
(D)	$$\frac{1}{\sqrt{T}}$$
Q.44	If melting, pyrolysis and combustion temperatures of polyester fibre are denoted by T_m, T_p and T_c respectively, then the correct order of temperatures is
(A)	$T_m < T_c < T_p$
(B)	$T_m < T_p < T_c$
(C)	$T_p < T_c < T_m$
(D)	$T_p < T_m < T_c$

Q.45	Group I indicates chemical agents and group II indicates their functions. Match the agent with its function.

	Group I		Group II
P.	BTCA (Butane tetra carboxylic acid)	1.	Crease recovery
Q.	Sodium hydrosulphite	2.	Sequestration
R.	THPC (Tetrakis hydroxyl methyl phosphonium chloride)	3.	Flame retardancy
S.	EDTA (Ethylene diamine tetra acetic acid)	4.	Reduction

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

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

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

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

Q.46	Amongst the following, the correct statement(s) for regenerated cellulosic fibres is/are
(A)	Degree of polymerization of Lyocell is higher than that of viscose
(B)	Degree of crystallinity of Lyocell is lower than that of viscose
(C)	Spinning dope of Lyocell is an aqueous solution
(D)	Wet strength of Lyocell is lower than that of viscose
Q.47	Amongst the following, the machine(s) that remove(s) neps is/are
(A)	Comber
(B)	Blowroom
(C)	Roving frame
(D)	Card

Q.48	Amongst the following, producing a dense fabric in a weaving machine require(s)
(A)	higher sley eccentricity
(B)	higher basic warp tension
(C)	lower cloth fell displacement at the time of beat up
(D)	stronger warp yarn
Q.49	Amongst the following, the instrument(s) used for measurement of neps in cotton fibre tuft is/are
(A)	HVI (High Volume Instrument)
(B)	Evenness tester
(C)	Fibrograph
(D)	AFIS (Advanced Fibre Information System)

Q.50	Amongst the following, the parameter(s) relevant to fibre fineness measurement using vibration method, is/are
(A)	length of the fibre specimen
(B)	natural fundamental frequency of vibration of the fibre specimen
(C)	breaking load of the fibre specimen
(D)	tension applied on the fibre specimen
Q.51	Amongst the following, the correct reason(s) for high pilling tendency in a woven fabric is/are
(A)	high twist level in the yarn
(B)	low twist level in the yarn
(C)	finer and stronger fibres in the yarn
(D)	weak and brittle fibres in the yarn

Q.52	Consider a cationic and an anionic softener both having linear alkyl chains. Upon application on cotton fabric, the orientation of the softener molecules on fabric can be described by the following statement(s)
(A)	The ionic part of the cationic softener will be close to the fabric surface and the alkyl chain will be oriented away
(B)	The ionic part of the anionic softener will be close to the fabric surface and the alkyl chain will be oriented away
(C)	The ionic part of the cationic softener will be oriented away from the fabric surface and the alkyl chain will be close to the fabric
(D)	The ionic part of the anionic softener will be oriented away from the fabric surface and the alkyl chain will be close to the fabric
Q.53	A cotton fabric is printed using resist style with a reactive dye for ground colour and a chemical resist agent. Amongst the following, the correct statement(s) is/are
(A)	Printing is followed by dyeing
(B)	Dyeing is followed by printing
(C)	The resist is acidic in nature
(D)	The resist is alkaline in nature

Q.54	Let X be a Poisson distributed random variable with parameter $\lambda(>0)$ such that it satisfies the equation $$P(X=1) = 3P(X=3) - P(X=2)$$ Then, the value of λ (*answer in integer*) is _____.
Q.55	If $u(x,y,z) = x^2y + y^2z + z^2x$, the value of $$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$$ at the point $(1,1,1)$ is (*answer in integer*) _____.
Q.56	A circular hollow polyester fibre with a tenacity of 0.02 N/tex breaks at 0.2 N. If the density of polyester is 1.38 g/cm^3 and the inner diameter of the fibre is 40 µm, the outer diameter (µm) of the fibre (*rounded off to 1 decimal place*) is _____.
Q.57	A polymer melt being extruded through a spinneret hole of circular cross-section exhibits a die-swell ratio of 2.2. The extrusion velocity and volumetric flow rate during this extrusion process are 20 m/min and 2.6×10^{-8} m^3/s, respectively. The maximum diameter (mm) of the extruded melt after exit from the spinneret hole (*rounded off to 2 decimal places*) is _____.

Q.58	A chute feed system feeds a fibre batt of linear density 300 g/m to a card. The waste extracted by the card is 5% and the total mechanical draft is 100. The linear density (ktex) of card sliver (*correct up to 2 decimal places*) is _____.
Q.59	A spun yarn made of circular polyester fibres of 10 μm diameter is cut normal to the yarn axis. If the helix angle of a fibre is 40°, then the area (μm^2) of that fibre projected on the cut-section of the yarn (*rounded off to 1 decimal place*) is _____.
Q.60	A needlepunching machine has two needle boards which operate sequentially at the same frequency to produce nonwoven with 200 punches/cm^2. Each needle board has 40000 needles per meter width. If the delivery speed of the machine is 80 m/min, then the frequency (strokes/min) of each needle board (*answer in integer*) is _____.
Q.61	In a projectile weaving machine, the projectile travels through the shed at an average speed of 24 m/s taking 2/3rd of the loom cycle. If the efficiency of the weaving machine is 90%, the weft insertion rate (m/min) is (*answer in integer*) _____.

Q.62	The breaking strain of a yarn is 1.5. If the stress (σ) and the strain (ε) of the yarn are related as, $\sigma = 1.5\varepsilon^2$, then the work factor of the yarn (*rounded off to 2 decimal places*) is _____ .
Q.63	In a tensile test, a 50 tex yarn specimen of 500 cm length extends by 10% at 600 cN. The length of the yarn after the removal of the load is 525 cm. The elastic recovery (%) of the yarn (*answer in integer*) is _____ .
Q.64	In water vapour transmission test of a fabric by evaporative dish method, the initial mass of the dish is 198 g. After 20 h of test, the mass of the dish becomes 188 g. The inner and outer diameters of the dish are 6.5 cm and 6.9 cm, respectively. The water vapour transmission rate (g/m^2/h) of the fabric (*rounded off to 2 decimal places*) is _____ .
Q.65	For crease resist finishing of cotton, 70 gpl aqueous solution of DMDHEU (molecular weight - 178) is applied by padding. If the DMDHEU is available as 50 % (w/v) aqueous solution, then the required amount of DMDHEU solution (ml) for preparation of 1000 ml padding liquor (*answer in integer*) is _____ .