TF: TEXTILE ENGINEERING AND FIBRE SCIENC

Duration: Three Hours

Read the following instructions carefully.

- StudentBounty.com 1. This question paper contains 16 printed pages including pages for rough work. Please check all pages and report discrepancy, if any.
- 2. Write your registration number, your name and name of the examination centre at the specified locations on the right half of the Optical Response Sheet (ORS).
- 3. Using HB pencil, darken the appropriate bubble under each digit of your registration number and the letters corresponding to your paper code.
- 4. All questions in this paper are of objective type.
- 5. Questions must be answered on Optical Response Sheet (ORS) by darkening the appropriate bubble (marked A, B, C, D) using HB pencil against the question number on the left hand side of the ORS. Each question has only one correct answer. In case you wish to change an answer, erase the old answer completely. More than one answer bubbled against a question will be treated as an incorrect response.
- 6. There are a total of 60 questions carrying 100 marks. Questions 1 through 20 are 1-mark questions, questions 21 through 60 are 2-mark questions.
- 7. Questions 51 through 56 (3 pairs) are common data questions and question pairs (57, 58) and (59, 60) are linked answer questions. The answer to the second question of the above 2 pairs depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is un-attempted, then the answer to the second question in the pair will not be evaluated.
- 8. Un-attempted questions will carry zero marks.
- 9. Wrong answers will carry NEGATIVE marks. For Q.1 to Q.20, ¹/₃ mark will be deducted for each wrong answer. For Q. 21 to Q. 56, 3/3 mark will be deducted for each wrong answer. The question pairs (Q.57, Q.58), and (Q.59, Q.60) are questions with linked answers. There will be negative marks only for wrong answer to the first question of the linked answer question pair i.e. for Q.57 and Q.59, 3 mark will be deducted for each wrong answer. There is no negative marking for Q.58 and Q.60.
- 10. Calculator (without data connectivity) is allowed in the examination hall.
- 11. Charts, graph sheets or tables are NOT allowed in the examination hall.
- 12. Rough work can be done on the question paper itself. Additionally, blank pages are given at the end of the question paper for rough work.

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2.1-	- Q. 20 carry one mark each.	ill de
Q.1	Jute, flax and ramie belong to the family	y of
	(A) Hair fibres	(B) Bast fibres
	(C) Leaf fibres	(D) Fruit fibres
		The second s
Q.2	The moisture regain (%) of nylon fibre	is in the range
	(A) 2.0 – 3.0	(B) 3.5 – 4.5
	(C) 5.0 – 6.0	(D) 6.5 – 7.5
Q.3	The density of polyester fibre is	
	(A) More than that of cotton	
	(B) More than that of nylon but less that	n that of cotton
	(C) Same as that of nylon	
	(D) More than that of polypropylene bu	t less than that of nylon
Q.4	The group of fibres produced by solution	on spinning is
	(A) Viscose and polyamide	a bangar belelud www.moone and an block below a second a q
	(C) Polyester and acrylic	(B) viscose and acrylic
	(c) rolyester and acryne	(D) I organitide and acetate
Q.5	The maximum practical limit of spindle	speed in a commercial cotton ring frame is around
	(A) 5000 rpm	(B) 10000 rpm
	(C) 20000 rpm	(D) 30000 rpm
Q.6	Ring spun cotton yarns of 30, 40, 50 an with a constant twist per cm of 10. Th surface fibres as	d 60 tex are made from the same fibre. All these yarns are spun the yarns can be arranged in descending order of helix angle of
	(A) 30, 60, 50, 40	(B) 40, 60, 50, 30
	(C) 30, 40, 50, 60	(D) 60, 50, 40, 30
Q.7	Hairiness of ring spun yarn increases, w	rhen
	(A) Traveller weight increases	
	(B) Front zone draft at ring frame increa	ises deserved a first state of the second state of

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(C) Spindle speed decreases

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(D) Ring rail speed increases

Q.8 Surface speed of cone in relation to surface speed of winding drum is

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- (A) Equal at all points
- (B) Higher at all points
- (C) Lower at all points
- (D) Higher at some points and lower at other points
- Q.9 Size is primarily applied on warp yarns to
 - (A) Increase yarn uniformity
 - (B) Increase yarn elongation
 - (C) Increase yarn modulus
 - (D) Provide protective coating against abrasion

Q.10 Sley velocity in m/sec at the front centre of a loom running at 300 rpm is

(A) 0	(B) 15
(C) 30	(D) 45

Q.11 Desizing of a grey cotton fabric having starch based size can not be done using

(A) Amylase enzyme	(B) dilute HCl		
(C) Hydrogen peroxide	(D) DMDHEU		

Q.12 A wool/acrylic blended fabric can be dyed to solid shade using a combination of

(A) Direct and acid dyes	(B) Vat and acid dyes
(C) Acid and basic dyes	(D) Reactive and direct dyes

Q.13 The following dye will be suitable for sublimation transfer printing of polyester

(A) Reactive dye	(B) Vat dye
(C) Acid dye	(D) Disperse dye

Q.14 Nep setting on evenness tester is related to the percent mass deviation based on yarn length of

(A) 10 mm	(B) 8 mm
(C) 4 mm	(D) 1 mm

Q.15 Uniformity ratio for normal variety of cotton is in the range

 (A) 0.2 - 0.3
 (B) 0.4 - 0.5

 (C) 0.7 - 0.8
 (D) 9.0 - 1.0

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Q.16 With increasing twist, spun yarn strength

- (A) Increases continuously
- (B) Decreases continuously
- (C) Decreases initially and then increases
- (D) Increases initially and then decreases

Q.17 The value of breaking length in km (RKM) of a yarn is numerically equal to

- (A) Tenacity in N/tex
- (B) Breaking load in N
- (C) Tenacity in gf/tex
- (D) Breaking load in gf

Q.18 The coefficient of $\cos 4x$ in the Fourier Series of the function

$$f(x) = \begin{cases} -1, & when - \pi < x < 0\\ 1, & when \\ 0 < x < \pi \end{cases} \text{ and } f(x) = f(x + 2\pi), \text{ for all } x \text{ is}$$
(A) 0 (B) 1 (C) -1 (D) π

Q.19 The partial differential equation

 $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} = 0$ is known as the polar form of

- (A) Laplace's equation
- (B) Heat equation
- (C) Wave equation
- (D) None of these

Q.20 Probability of getting 16 in one throw with 3 dice is

(A)
$$\frac{1}{8}$$
 (B) $\frac{3}{16}$ (C) $\frac{1}{36}$ (D) $\frac{1}{108}$

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O. 21 to O. 60 carry two marks each.

- StudentBounty.com Q.21 Radius of the circle passing through P(2, 4) and the points of intersection with the x - axistangent and normal drawn at P to the curve $y^2 = 8x$ is
 - (C) 3 (B) 2 (D) 4 (A) 1
- If the determinant and trace of a 2×2 matrix M are -1 and 0 respectively, then the determinant of Q.22 $M + M^{-1}$ is
 - (C) 1 (D) 0 (A) - 4(B) - 2
- If S is the largest possible set of real numbers x for which the series Q.23
 - $\sum_{n=1}^{\infty} \frac{x^n}{n}$ is convergent, then S is (D) $(-\infty,\infty)$ (A) (-1, 1) (B) [-1, 1) (C) [-1, 1]
- If the Laplace transform of a function Q.24

$$f(t)$$
 is $\frac{1}{s^3 - s}$, then $f(t)$ is

(A) $\cosh t - 1$ (B) $\cosh t + 1$ (C) $\sinh t - 1$ (D) $\sinh t + 1$

- The general solution of the differential equation Q.25
 - $x^{2}\frac{d^{2}y}{dx^{2}} + 2x\frac{dy}{dx} \frac{y}{x^{2}} = 0$ is
 - (A) $y = c_1 \cos x + c_2 \sin x$
 - (B) $y = c_1 e^x + c_2 e^{-x}$
 - (C) $y = \left(c_1 + \frac{c_2}{x}\right)e^{(1/x)}$

(D)
$$y = (c_1 + c_2 x)e^x$$

Q.26 The absolute value of the directional derivative of the surface given by

The absolute value of the directional derivative of the surface given by

$$\frac{x^2}{1} + \frac{y^2}{4} + \frac{z^2}{9} = 3 \text{ at } P(1, 2, 3) \text{ in the direction of the line } OP, \text{ where } O \text{ denotes}$$
(A) $\frac{3}{\sqrt{14}}$
(B) $\frac{\sqrt{14}}{3}$
(C) $\frac{6}{\sqrt{14}}$
(D) $\frac{\sqrt{14}}{6}$

Q.27 Consider the fibres in Group I and the corresponding monomer(s) in Group II. Choose the correct combinations from amongst A, B, C and D.

	Group I		Group II
P.	Polyester (PET)	1.	CH ₂ =CH.CN, CH ₂ =CH.COOCH ₃
Q.	Nylon 6	2.	HO–(CH ₂) ₂ –OH, HOOC–(O)–COOH
R.	Nylon 6,6	3.	HOOC-(CH ₂) ₆ -COOH, H ₂ N-(CH ₂) ₆ -NH ₂
S.	Acrylic	4.	НО−(CH ₂) ₄ −ОН, НООС-{◯}-СООН
		5.	HOOC-(CH ₂) ₄ -COOH, H ₂ N-(CH ₂) ₆ -NH ₂
		6.	H ₂ N-(CH ₂) ₅ -COOH
(A)	P-4 0-1 R-5 S-3		(B) P-2 O-6 R-5 S-1

(C) P-2, Q-6, R-3, S-4

(D) P-3, Q-2, R-5, S-1

Q.28 With increase in relative humidity from 0 to 100%, the tensile properties of cotton fibre change such that

(A) Modulus and strength increase, extensibility decreases

- (B) Modulus decreases, strength and extensibility increase
- (C) Modulus and strength decrease, extensibility remains same
- (D) Modulus and strength decrease, extensibility increases

Q.29 On drawing and heat setting, the properties of synthetic fibres change such that

- (A) Modulus and tenacity increase, extensibility decreases
- (B) Modulus increases, tenacity and extensibility decrease
- (C) Modulus, tenacity as well as extensibility increase
- (D) Modulus and tenacity increase, extensibility remains same

Consider the fibre characterization techniques in Group I used to test the physical propertie Q.30 II. Choose the correct combinations from amongst A, B, C and D.

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				3°
		-		.9
Cor	sider the fibre characterization techniques	in Gr	oup I used to test	the physical propertie
П. (Choose the correct combinations from among	gst A	, B, C and D.	the physical propertie
	dimention of the second second of the second s			
	Group I		Group II	
P.	Thermogravimetry (TGA)	1.	Birefringence	
Q.	Differential Scanning Calorimetry (DSC)	2.	Crystallinity	
R.	X-Ray Diffraction	3.	Degradation tem	perature
S.	Polarizing Optical Microscopy	4.	Melting and crys	stallisation temperature
(4)	P4 0 2 P 2 C 1 (D)	D 2	020104	
(A)	r-4, Q-5, K-2, 5-1 (B)	P-3,	Q-2, K-1, 5-4	
(C)	P-3, Q-4, R-2, S-1 (D)	P-3,	, Q-4, R-1, S-2	

Q.31 Consider the following elements in Group I and Group II and choose the correct alternative from amongst A, B, C and D.

	Group I		Group II
P.	Licker-in	1.	High speed, fine wires
Q.	Cylinder	2.	Fibre rupture, coarse wires
R.	Flats	3.	Wires with acute front angle, condensing of fibre
S.	Doffer	4.	Slow speed, stripping action
		5.	Nep removal, slowest speed
(A)	P-5, Q-3, R-2, S-1		(B) P-1, Q-2, R-5, S-4
(C)	P-4, Q-4, R-3, S-5		(D) P-2, O-1, R-5, S-3

Pressure field from the nip of drafting roller can be extended by Q.32

(A) Reducing roller pressure and increasing hardness of top roller

(B) Reducing mass of fibre stands and reducing roller diameter

(C) Increasing roller diameter and increasing roller pressure

(D) Increasing width of fibre strand and increasing hardness of top roller

Q.33 The packing coefficient of a yarn with 100 fibres is increased by 10%, the percentage change in yarn diameter will be approximately

A) –16.9		(B) –10.9		
C) – 4.9		(D) 4.9		

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StudentBu Consider the following elements in Group I and Group II and choose the Q.34 native from amongst A, B, C and D.

Group I		Group	p II		128
P. Wrap spi	nning	1. Core s	heath structure, high	gh production rate	2.5
Q. Air-jet sp	binning	2. Wrapp	per fibre belts and o	commonly used fo	r denim
R. Friction S	Spinning	3. Mostly	y used for man-mad	de fibres, stiffer ya	arns
S. Rotor spi	nning	4. Comp	osite yarn, low proe	duction rate	
		5. Versat	ile in range of fibre	es and yarn counts	.50.341 A
(A) P-4, Q-3,	R-1, S-2				
(B) P-1, Q-5,	R-2, S-4				
(C) P-3, Q-2,	R-4, S-5				
(D) P-2, Q-1,	R-5, S-3				
A blowroom is	having five mach	ines. The tota chine is 30%.	l cleaning efficient The overall cleani	cy for first four m ng efficiency (%)	achines is 40%. Th
cleaning efficie	ency of the last ma				or the blowroom is
cleaning efficie (A) 70	ency of the last ma (B) 64		(C) 58	(D) 52	of the blowroom is
A) 70	ency of the last ma (B) 64		(C) 58	(D) 52	
A) 70 For increasing	ency of the last ma (B) 64 the taper angle on	a sectional wa	(C) 58 arping machine, on	(D) 52 e would require to	
A) 70 For increasing	(B) 64 (B) 64 the taper angle on	a sectional wa	(C) 58 arping machine, on	(D) 52 e would require to	
A) 70 For increasing A) Increase the B) Decrease the	(B) 64 (B) 64 the taper angle on e traverse speed	a sectional wa	(C) 58 arping machine, on	(D) 52 e would require to	

- (D) Decrease the warping speed
- A fabric having 30 tex warp and 20 tex weft with 40 ends/cm and 30 picks/cm has 10% crimp in both Q.37 warp and weft yarns. The fabric weight in g/m² will be
 - (A) 178 (B) 188 (C) 198 (D) 208

A 180 cm wide fabric with 30 picks/cm is produced on a loom running at 500 rpm with 95% Q.38 efficiency. The number of metres of fabric produced per hour will be

(A) 9.0	(B) 9.5	(C) 10.0	(D) 10.5
			(2) 10.

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Q.35

Q.36

Q.39 Restarting a loom after the overnight stoppage will have

(A) Higher than set pick spacing at start

(B) Lower than set pick spacing at start

(C) Same as set pick spacing at start

StudentBounty.com (D) Sometimes higher but mostly lower pick spacing than set pick spacing at start

In fully relaxed state the loop shape factor (defined as a ratio of courses per unit length to wales per 0.40 unit length) of a plain weft knitted cotton fabric will be approximately

(A) 0.3 (B) 0.8 (C) 1.3 (D) 1.8

Consider the elements in Group I and Group II and choose the correct alternative from amongst A, B, 0.41 C and D.

Hydrogen peroxide

Group I

Group II

Ρ. **Resin finishing** 1. Polyester dyeing 0. Carrier 2. Cellulase

4.

- R. Biopolishing
- 3. DMDHEU
- S. Discharge printing
- 5. Pectinase
- 6. Sodium sulphoxylate formaldehyde
- (A) P-3, Q-1, R-2, S-6
- (B) P-6, Q-1, R-4, S-3
- (C) P-3, Q-6, R-1, S-5
- (D) P-3, Q-6, R-4, S-1

Q.42 Consider the following statements :

- P. Presence of iron and copper ions during bleaching with sodium chlorite is desirable.
- Q. Sodium silicate is used as a stabilizer in bleaching of cotton with hydrogen peroxide.
- R. Oil repellent finishes are based on fluorochemicals.
- S. Sodium hydrosulphite is used as a reducing agent in vat printing.

Choose the correct set of statements from amongst the alternatives A, B, C and D.

(A) P, S (B) O. S (C) P, R (D) O, R

Saponification with sodium hydroxide is done to increase the soil release property of Q.43

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Q.44	The highest rate of production in p	printing is obtained on
	(A) Flat bed printing	(B) Block printing
	(C) Digital printing	(D) Rotary screen printing
Q.45	The optimum conditions for bleac	hing cotton with hydrogen peroxide are
	(A) pH 7, 60°C	(B) pH 7, boil
	(C) pH 10, 60°C	(D) pH 10, boil

Q.46 Length of 2 kg of 180 denier polyester yarn is

(A)	90 km	(B) 100 km
(C)	180 km	(D) 360 km

Q.47 Consider the instruments of Kawabata Evaluation System in Group I and the properties measured in Group II and choose the correct alternatives from amongst A, B, C and D.

	Group I		Group II
P.	KES-FB1	1.	Compression
Q.	KES-FB2	2.	Abrasion
R.	KES-FB3	3.	Hygral expansion
S.	KES-FB4	4.	Bending
		5.	Surface friction
		6.	Shear
(A)	P-6, Q-4, R-1, S-5		(B) P-3, Q-1, R-4, S-5
(C)	P-6, Q-2, R-4, S-3		(D) P-4, Q-2, R-1, S-3

Q.48 Projected area of a 30 cm diameter fabric specimen placed on 20 cm diameter support plate of drape tester is 302 cm². Drape coefficient for this fabric is approximately

(A) 0.47	(B) 0.57	(C) 0.67	(D) 0.77

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Q.49	99% confidence samples require	e range of the mean yarn s d to obtain 99% confidence	trength based on 64 test trange of ± 4 of the yarn	samples is ± 8. The strength will be
	(A) 64	(B) 128	(C) 256	(D) 512
Q.50	The tear resistar	nce of woven fabric increas	es with	
	(P) Increase	in yarn to yarn friction		
	(Q) Increase	in yarn strength		
	(R) Increase	in thread spacing		
	(S) Increase	in float length		
	Choose the corre	ect combinations from amo	ngst the alternatives A. I	B. C and D.
				nked Amirer Questions 57 and
	(A) P, Q, R	(B) Q, R, S	(C) P, R, S	(D) P, Q, S
Com	mon Data Que	estions		
Comn	non Data for Que	estions 51 and 52:		
The fe 3% an	ed rate of a card i d 1% respectively	s 100 kg/hour and the deliv	very rate is 400 m/min. L	icker-in droppings and flat strips
Q.51	The count of car	d sliver (Ne) will be approx	ximately	
	(A) 0.16	(B) 0.15	(C) 0.14	(D) 0.13
2.52	If the total draft	in the card is decreased by	10%, the sliver linear de	nsity in ktex will be
	(A) 6.4	(B) 5.4	(C) 4.4	(D) 3.4
Comn	non Data for Que	estions 53 and 54:		
Assum sett wo	ne Peirce's Geome ould have	etry and circular yarn of 0.	5 mm diameter. A square	e plain woven fabric with maxim
Q.53	Thread spacing ((mm) in the fabric as		
	(A) 0.433	(B) 0.500	(C) 0.866	(D) 1.000
Q.54	Approximate cri	mp (%) in warp and weft y	arns as	

Common Data for Questions 55 and 56:

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StudentBounty.com Ten thousand metre of polyester fabric is to be dyed to 2% depth of shade by continuous method. the fabric is 1.5 m and mass per unit area is 200 g/m². Assume the specific gravity of the dye lique and a wet pickup of 80% after padding.

0.55 The volume of the liquor in litres used on the fabric would be

(A) 2000	(B) 2400	(C) 2800	(D) 3200
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0.56 The concentration (gpl) of the dye bath would be

> (A) 40 (B) 35 (C) 30 (D) 25

Linked Answer Questions

Linked Answer Questions 57 and 58:

Q.57 The relationship between percent moisture regain (R) and percent moisture content (M) is

(A)	M = -R	$(\mathbf{P}) \mathbf{M} = \mathbf{R}$	
	$\frac{m}{1+(R/100)}$	(B) $M = \frac{1}{1+R}$	
0	R M	(D) $M = \frac{1+R}{1+R}$	
	$K = \frac{1}{1 + (M/100)}$	$(D) M = \frac{100R}{100R}$	

0.58 If the percent moisture regain (R) of a fibre is 8, its percent moisture content (M) would be approximately

(C) 7.6 (A) 7.4 (B) 7.2 (D) 7.0

Linked Answer Questions 59 and 60:

Q.59 Two roving with a CV of 8% each are fed into a spinning zone and if the spinning unit adds 8% CV, the CV% of output yarn will be approximately

(A) 8.0	(B) 8.9	(C) 9.8	(D) 12.0
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Q.60 The CV% of 3-ply yarn produced using these single yarns will be approximately

(A) 4.93	(B) 5.66	(C) 6.93	(D) 9.24

END OF THE QUESTION PAPER