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Mechanical Engineering Previous Year Solved Papers

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|ME-GATE-2011|

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### **MECHANICAL ENGINEERING**

Q. No. 1 - 25 Carry One Mark Each

1.	A str	eamline and an equi-potential line in a flow field
	(A)	are parallel to each other
	(B)	are perpendicular to each other
	(C)	intersect at an acute angle
	(D)	are identical
Ansv	ver:	( <b>B</b> )
2.		nass of moist air in an airtight vessel is heated to a higher temperature, then
	(A)	Specific humidity of the air increases
	(B)	Specific humidity of the air decreases
	(C)	Relative humidity of the air increases
	(D)	Relative humidity of the air decreases
Ansv	ver:	( <b>D</b> )
3.	In a c	condenser of a power plant, the steam condenses at a temperature of $60^{\circ}$ C. The cooling water enters
	at 30	$0^{\circ}$ C and leaves at 45°C. The logarithmic mean temperature difference (LMTD) of the condenser is
	(A)	16.2°C (B) $21.6^{\circ}$ C (C) $30^{\circ}$ C (D) $37.5^{\circ}$ C
Ansv		( <b>B</b> )
4.	A sir	nply supported beam PQ is loaded by a moment of 1kN-m at the mid-span of the beam as shown in
	the fi	igure. The reaction forces $R_p$ and $R_Q$ at supports P and Q respectively are
		11-N1
		$P \wedge \qquad $
		$P \longrightarrow 1m$ $Q$ $Q$

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(A	A) 1	1kN downward, 1kN upward
(B	B) (	0.5kN upward, 0.5kN downward
(C	C) (	0.5kN downward, 0.5kNupward
(D	<b>)</b> ) 1	1kN upward, 1kN upward
nswer:	: (	(A)
		hat PQ is a single link. The mobility of the mechanism is
(A		-1 (B) 0 (C) 1 (D) 2
nswer:		(C)
. Tł	ne ma	aximum possible draft in cold rolling of sheet increases with the
(A	A) I	Increase in coefficient of friction
	0	Decrease in coefficient of friction
(B	<i>י</i> י יי	
(B (C	,	Decrease in roll radius
	<b>C)</b> ]	Decrease in roll radius Increase in roll velocity

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8.	A ho	ble is dimension $\phi 9_{+0}^{+0.015}$ mm. Th	e corresponding s	haft is of dimension $\phi 9^{+0}_{+0}$	<sup>010</sup> mm. The resultin
	asser	nbly has			
	(A)	Loose running fit	(B)	Close running fit	
	(C)	Transition fit	(D)	Interference fit	
Ansv	ver:	(C)			
9.	Heat	and work are			
	(A)	Intensive properties	(B)	Extensive properties	
	(C)	Point functions	(D)	Path functions	
Ansv	ver:	( <b>D</b> )			
10.	A co	lumn has a rectangular cross-se	ction of $10 \text{mm} \times 20$	mm and a length of 1m.	The slenderness ratio o
	the c	olumn is close to			
	(A)	200 (B) 346	(C)	477 (D)	1000
Ansv	ver:	<b>(B)</b>			
11.	A set	ries expansion for the function s	inθ is		
	(A)	$1 - \frac{\theta^2}{2!} + \frac{\theta^4}{4!} - \dots$	(B)	$\theta - \frac{\theta^3}{2} + \frac{\theta^5}{2} - \dots$	
				3! 5!	
	(C)	$1 + \theta + \frac{\theta^2}{2!} + \frac{\theta^3}{3!} + \dots$	(D)	$\theta + \frac{\theta^3}{3!} + \frac{\theta^5}{5!} + \dots$	
Ansv		(B)		5: 5:	
	vel.	( <b>b</b> )			
12.	Gree	n sand mould indicates that			
	(A)	Polymeric mould has been cur	red		
	(H) (B)	Mould has been totally dried			
	(D) (C)	Mould is green in colour			
	(C) (D)	Mould contains moisture			
Ansv		(D)			
		()			

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13.	What	t is $\lim_{\theta \to 0} \frac{\sin \theta}{\theta}$ equ	ual to?					
	(A)	θ	(B) $\sin \theta$	(C)	0	(D)	1	
Ansv	ver:	( <b>D</b> )						
L <b>4.</b>	Eiger	n values of a real	symmetric matrix	are always				
	(A)	positive	(B) negative	-	real	(D)	comp	olex
Ansv	ver:	( <b>C</b> )					Ĩ	
.5.	A pi	pe of 25mm ou	ter diameter carrie	s steam. The he	at trans	sfer coefficient b	etween	the cylinder and
	surro	oundings is 5W	/m <sup>2</sup> K. It is propo	osed to reduce the	he heat	loss from the p	ipe by	adding insulation
	havir	ng a thermal con	ductivity of 0.05W/	mK. Which one	of the f	ollowing stateme	nts is T	RUE?
	(A)	The outer radiu	is of the pipe is equ	al to the critical	radius			
	(B)	The outer radiu	is of the pipe is less	than the critical	radius			
	(C)	Adding the ins	ulation will reduce	the heat loss				
	(D)	Adding the ins	ulation will increase	e the heat loss				
Ansv	ver:	( <b>C</b> )						
6.	The	contants of a vi	ell-insulated tank a	na haatad hu a m	aiston s	of 220 in which	104	umant is flowing
υ.								, in the second s
			ong with its content					
			e system are positi	ve. The faces of f	ieat (Q	), WOIK (W) and	change	in internal energy
	$(\Delta U)$	) during the prod						
	(A)	Q = 0, W = -2.	$3, \Delta U = +2.3$	(B)	Q = +2	$2.3, W = 0, \Delta U = -$	+2.3	
	(C)	Q = -2.3, W =	$0, \Delta U = -2.3$	(D)	Q=0,	$W = +2.3, \Delta U = -$	-2.3	
nsv	ver:	( <b>A</b> )						
<b>7.</b>	Matc	h the following	criteria of material	l failure, under b	oiaxial s	stresses $\sigma_1$ and	$\sigma_2$ and	d yield stress $\sigma_y$
	with	their correspond	ing graphic represe	ntations:				
		1						

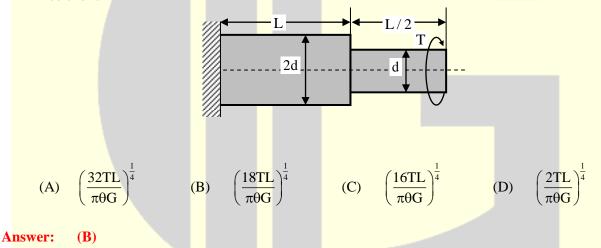
	ing success	ME-GATE-20	011	<u>www.gateforumonline</u>
Р	P. Maximum-normal-stre	ess criterion	- <sub>σy</sub>	$\sigma_2$ $\sigma_2$ $\sigma_y$ $\sigma_1$
C	2. Maximum-distortion-e	energy criterion M.	-σ <sub>y</sub>	$\sigma_2$ $\sigma_y$ $\sigma_1$ $\sigma_y$ $\sigma_1$
R	R. Maximum-shear–stress	s criterion N.	$-\sigma_{y}$	$\sigma_2$ $\sigma_{\gamma}$ $\sigma_1$ $\sigma_{\gamma}$
(A)	P-M, Q-L, R-N	(B)	P-N, Q-M, R-L	
(C)	P-M, Q-N, R-L	(D)	P-N, Q-L,R-M	
nswer:	( <b>C</b> )			
			••••••	
8. The	product of two complex nu	mbers $1 + i$ and $2-5i$ is		
(A)	7–3i (B)	3–4i (C)	-3-4i	(D) 7+3i
nswer:	(A)			
9. Cars	s arrive at a service station	according to Poisson's	s distribution with a	mean rate of 5 per hour.
serv	vice time per car is exponent	tial with a mean of 10m	inutes. At steady sta	ate, the average waiting time
the	queue is			
(A)	10 minutes	(B)	20 minutes	
(C)	25 minutes	(D)	50 minutes	
	( <b>D</b> )			

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20.	The word 'kanban' is most appropriately associated with								
	(A)	Economic order	quantity						
	(B)	Just-in-time pro	oduction						
	(C)	Capacity plannir	ng						
	(D)	Product design							
Ansv	ver:	<b>(B</b> )							
21.	If f(x	x) is an even function	on and is 'a' j	positive real numb	per, then $\int_{-a}^{a} f($	x)dx equals			
	(A)	0	(B) a	(C	) 2a	(D)	$2\int_{0}^{a}f(x)dx$		
Ansv	ver:	( <b>D</b> )							
2.	The	coefficient of restit	ution of a per	rfectly plastic imp	act is				
	(A)	0	(B) 1	(C		(D)	$\infty$		
Ansv	ver:	(A)	, í						
• • • • •									
23.	A th		1. 500	om and thickness	10mm is subi				
	Aun	in cylinder of inner	r radius 500n	inn and the Kness	Tomm is subj	ected to an inte	ernal pressure of 5MF		
		in cylinder of inner average circum-fer			Tomin is subj	ected to an inte	ernal pressure of 5MF		
						ected to an into (D)	ernal pressure of 5MF 1000		
	The	average circum-fer	ential (hoop)	stress in MPa is					
	The a	average circum-fer 100	ential (hoop)	stress in MPa is					
Ansv	The and the an	average circum-fer 100	ential (hoop) (B) 250	stress in MPa is (C	) 500	(D)	1000		
Ansv	The and the an	average circum-fer 100 ( <b>B</b> )	ential (hoop) (B) 250 ollowing wel	stress in MPa is (C	) 500	(D)	1000		
Ansv	The a (A) wer: Whice	average circum-fer 100 ( <b>B</b> ) ch one among the f	ential (hoop) (B) 250 ollowing wel	stress in MPa is (C	) 500	(D)	1000		
Ansv	The a (A) wer: White (A)	average circum-fer 100 (B) ch one among the f Gas metal arc we	ential (hoop) (B) 250 following wel elding relding	stress in MPa is (C	) 500	(D)	1000		
	The a (A) wer: White (A) (B)	average circum-fer 100 (B) ch one among the f Gas metal arc we Submerged arc w	ential (hoop) (B) 250 ollowing wel elding velding welding	stress in MPa is (C	) 500	(D)	1000		

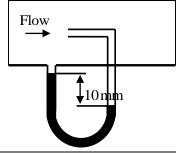
	gineering	ORUM Ig Success [M]	E-GATE-2011	www.gateforumonline.co
25.	The c	crystal structure of austenite is		
(	(A)	Body centered cubic		
(	(B)	Face centered cubic		
(	(C)	Hexagonal closed packed		
(	(D)	Body centered tetragonal		
Answe	er:	<b>(B)</b>		

#### **Q. No. 26 – 55 Carry Two Marks Each**

26. A torque *T* is applied at the free end of a stepped rod of circular cross-sections as shown in the figure. The shear modulus of the material of the rod is G. The expression for *d* to produce an angular twist  $\theta$  at the free end is



27. Figure shows the schematic for the measurement of velocity of air (density =  $1.2 \text{kg/m}^3$ ) through a constant-area duct using a pitot tube and a water-tube manometer.



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T	he differential	head of wa	ter (density	$= 1000  \text{kg}  /  \text{m}^3$ )	in the t	wo columns of	the manometer is 10r	nm.
T	ake acceleratio	on due to gra	vity as 9.8m	$1/s^2$ . The velocit	y of air i	n m/s is		
(4	A) 6.4	(B	) 9.0	(C)	12.8	(D)	25.6	
Answer	: (C)							
28. T	ha valuas of a	nthalny of st	om at tha i	nlat and outlat of	o stoom	turbing in a Par	kine cycle are 2800k.	L/ka
							ion in kg/kW-hour is	i/Kg
	A) 3.60	(B		(C)	0.06	(D)	0.01	
Answer		Ì	, 			、 <i>,</i>		
<b>29. T</b> i	be integral $\int_{0}^{3}$	1 dv. uhon	avaluated k	w using Simps	$n^{2} = 1/2$	rula on two or	ual subintervals each	
<b>47.</b> 1	$\int_{1}^{1}$	x	evaluated	by using simpse	JII S 1/3	Tule off two eq	ual subilitervais each	1 01
16	ength 1, equals	S						
(4	A) 1.000	(B	) 1.098	(C)	1.111	(D)	1.120	
Answer	: (C)							
_								
					ads 30kN	and 45kN resp	ectively. The ratio of	the
	fe of bearing F				0/4		2/2	
	A) 81/16 : ( <b>B</b> )	(B	) 27/8	(C)	9/4	(D)	3/2	
Answer	• (B)							
<b>31.</b> Fo	or the four-bar	· linkage sho	wn in the fic	gure, the angular	velocity	of link AB is 1	rad/s	
		ininkuge site		Sure, the ungulur	~ ciocity			
			B					
				N				
			*	1  rad/s				
			A	<u> </u>				
			11111		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<i></i>		
			Colutions Did. 14	No port of this headlast a	ho romentur	lor utilized in one forme in		
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	1 1 1 1				
	length of link CD nk CD in rad/s is	1s 1.5 times the lef	ngth of link AB. In the co	onfiguration shown, the angu	ilar veloc
		3		2	
(A)	3	(B) $\frac{3}{2}$	(C) 1	(D) $\frac{2}{3}$	
answer:	( <b>D</b> )				
<b>2.</b> A ste	one with mass of	0.1kg is catapulted	as shown in the figure. T	The total force $F_x(in N)$ ex	erted by
rubb	er band as a funct	ion of distance x (ii	n m) is given by $F_x = 300$ :	$\mathbf{x}^2$ .	
			,		
			G		
		x			
		Fx			
		Stone			
		mass 0.	1kg		
If th	e stone is displace	ced by 0.1m from	the un-stretched position	(x=0) of the rubber band,	the ener
	ed in the rubber ba				
(A)	0.01J	(B) 0.1J	(C) 1J	(D) 10J	
nswer:	<b>(B</b> )	, ,	~ /		
	(D)				
3. Cons	sider the different	ial equation $\frac{dy}{dx} = (1)$	$(1 + y^2)x$ . The general solution	ution with constant c is	
		un			
(A)	$y = tan \frac{x^2}{2} + tan$	ıc	(B) $y = \tan^2$	$\left(\frac{x}{2}+c\right)$	
	2				
	$y = \tan^2\left(\frac{x}{2}\right) + c$	с	(D) $y = tan \left( \int_{a}^{b} \frac{dx}{dx} \right) = tan \left( \int_{a}^{b} d$	$\frac{\mathbf{x}^2}{\mathbf{x}^2} + \mathbf{c}$	
(C)	(2)			2 )	
(C)					
(C)	( <b>D</b> )				
	( <b>D</b> )				





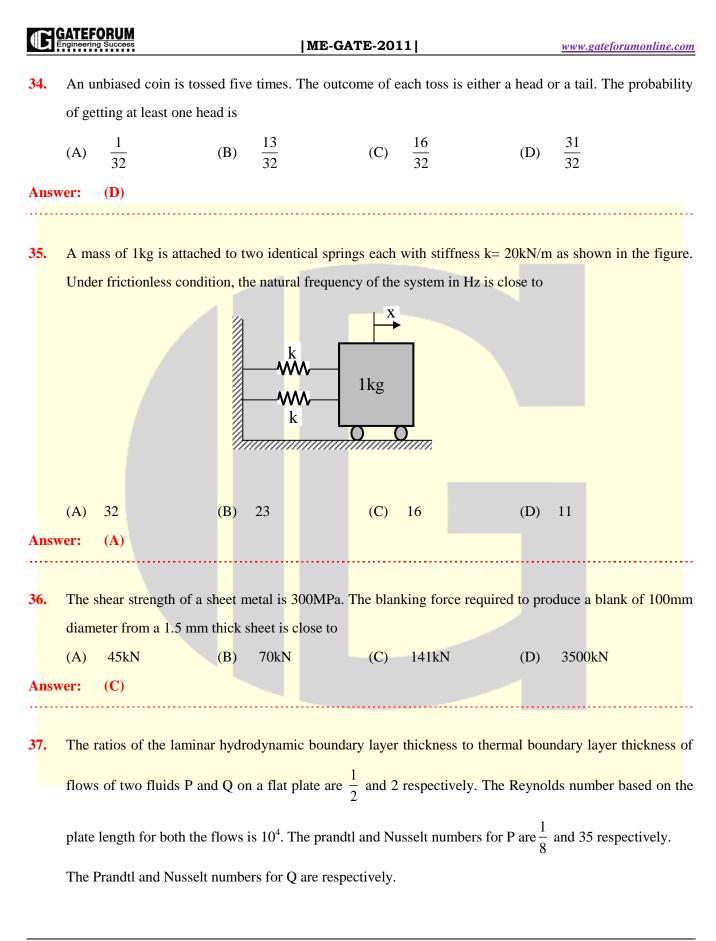
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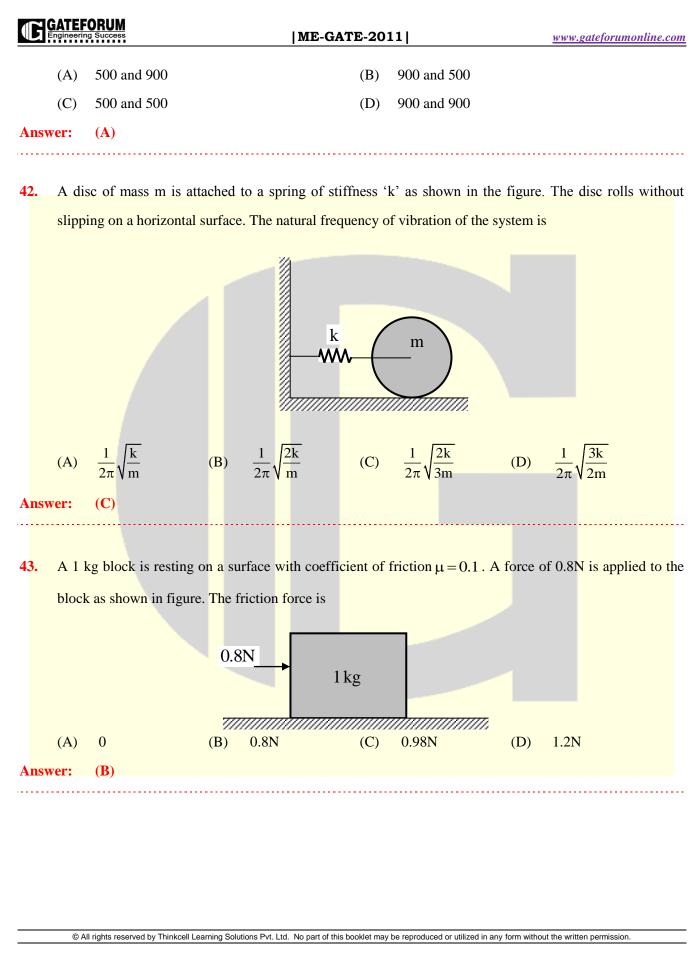
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	(A)	8 and 140	(B)	8 and 70	(C)	4 and 70	(D)	4 and 35
Ans	wer:	(A)						
8.	The	crank radius of a	ı single–c	ylinder I. C. eng	gine is 60r	nm and the dia	meter of th	e cylinder is 80mm. T
	swep	ot volume of the	cylinder i	n cm <sup>3</sup> is				
	(A)	48	(B)	96	(C)	302	(D)	603
ns.	wer:	( <b>D</b> )					_	_
• • • •								
9.	A pu	mp handling a	liquid rais	ses its pressure	from 1 ba	r to 30 bar. Ta	the the den	sity of the liquid as 9
	kg /	m <sup>3</sup> . The isentro	- pic specif	ic work done by	the pump	in kJ/kg is		
	(A)	0.10		0.30	(C)	2.50	(D)	2.93
			(D)	0.50	(C)	2.50	(D)	2.95
	wer:	( <b>D</b> )						
•	<b>A</b> am	haviaal staal hall	of 12mm	diamatan in init	: aller at 10		1	a aurora din a af 200
0.	-						-	a surrounding of 300 $5W/m^2 K$ The share
								$5 \text{ 5W/m}^2\text{K}$ . The therm
			18 20 W	mK. The tempe	rature diff	erence betwee	n the centr	e and the surface of t
		ball is	1	., .	c 1 · 1	a a	,,	
	(A)			on resistance is	-			
	(B)			on resistance is				
	(C)			on resistance is	0			
	(D)	Small because	conduction	on resistance is	far less tha	in the convectiv	ve resistanc	e
		<b>(D)</b>						

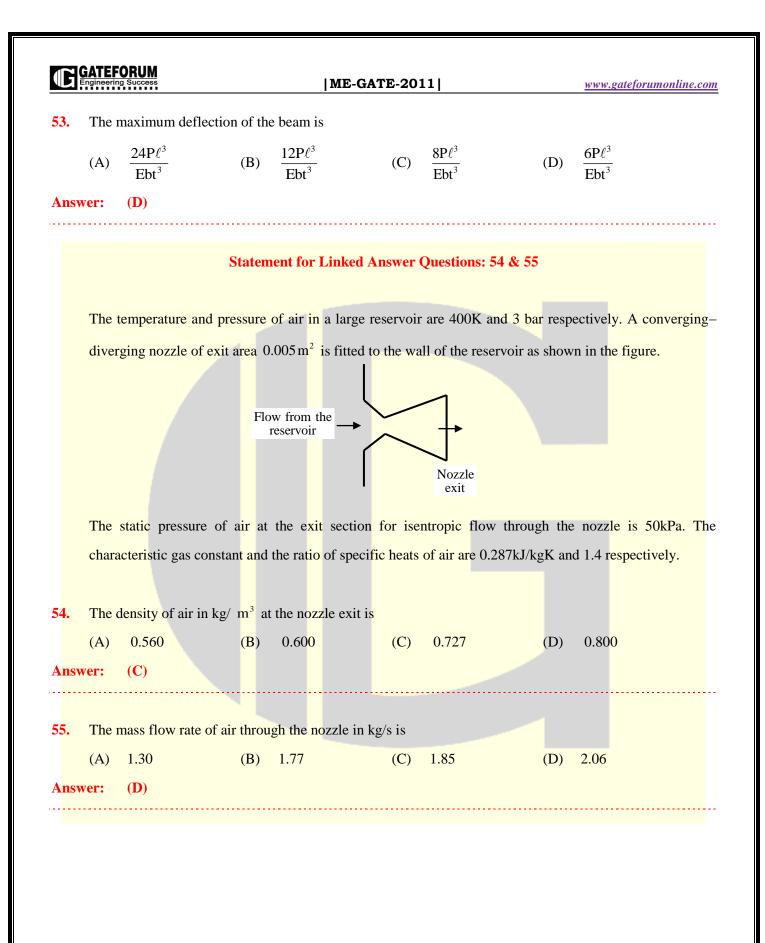
41. An ideal Brayton cycle, operating between the pressure limits of 1 bar and 6 bar, has minimum and maximum temperatures of 300K and 1500K. The ratio of specific heats of the working fluid is 1.4. The approximate final temperatures in Kelvin at the end of the compression and expansion processes are respectively



	Engineering Su	ICCESS		ME-GATE-2	2011		<u>www</u> .	.gateforumonline.c
4.	Conside	er the following s	ystem of equa	tions				
	$2x_1 + x_2$	$_{2} + x_{3} = 0$ ,						
		$-x_{3}=0,$						
	<b>X</b> <sub>1</sub>	$+ x_2 = 0.$						
	This sys	stem has						
	(A) a	unique solution						
	(B) n	o solution						
	(C) ir	finite number of	solutions					
	(D) fi	ve solutions	1					
ns	wer: (	C)						
••••								
5.	A single	e-point cutting to	pol with $12^{\circ}$ 1	rake angle is us	ed to mach	ine a steel v	vork-piece.	The depth of c
	i.e. unc	ut thickness is 0.	81mm. The cl	nip thickness u	nder orthog	onal machir	ing conditi	on is 1.8mm. T
	shear ar	gle is approxima	ıtely					
	(A)	22°	(B) 26°	(C	) 56°		(D) 76°	
ns	wer: (l	<b>B</b> )						
5.	Match	the following n	on-traditional	machining pr	ocesses wi	th the corre	s-ponding	material remov
5.	Match mechan		on-traditional	machining pr	ocesses wi	th the corre	es-ponding	material remov
5.	mechan		on-traditional	machining pr	ocesses wi	th the corre	es-ponding	material remov
5.	mechan Machin	isms:		machining pr	ocesses wi	th the corre	s-ponding	material remov
5.	mechan Machin P. C	isms: ing process	ng	machining pr	ocesses wir	th the corre	s-ponding	material remov
5.	mechan Machin P. C Q. E	isms: <b>ing process</b> 'hemical machini	ng nachining	machining pr	ocesses wi	th the corre	s-ponding	material remov
5.	mechan Machin P. C Q. E R. E	isms: <b>ing process</b> hemical machini lectro-chemical r	ng machining e machining	machining pr	ocesses wi	th the corre	s-ponding	material remov
5.	mechan Machin P. C Q. E R. E S. U	isms: <b>ing process</b> Themical machini lectro-chemical r lectro – discharg	ng machining e machining ing	machining pr	ocesses wit	th the corre	s-ponding	material remov
5.	mechan Machin P. C Q. E R. E S. U Mechan	isms: <b>ing process</b> Themical machini lectro-chemical r lectro – discharg Ttrasonic machin	ng machining e machining ing	machining pr	ocesses wi	th the corre	s-ponding	material remov
5.	mec⊢an Mac⊢in P. C Q. E R. E S. U Mec⊢an	isms: <b>ing process</b> Themical machini lectro-chemical r lectro – discharg Itrasonic machin <b>hism of material</b>	ng machining e machining ing <b>removal</b>	machining pr	ocesses wi	th the corre	es-ponding	material remov
б.	mechan Machin P. C Q. E R. E S. U Mechan 1. E	isms: <b>ing process</b> hemical machini lectro-chemical r lectro – discharg Itrasonic machin <b>nism of material</b> rosion	ng machining e machining ing <b>removal</b>	machining pr	ocesses wir	th the corre	es-ponding	material remov

(A) $P-2, Q-3, R-4, S-1$ (B) $P-2, Q-4, R-3, S-1$ (C) $P-3, Q-2, R-4, S-1$ (D) $P-2, Q-3, R-1, S-4$ Answer: (A) 47. A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric solidification of 4% and 6% respectively. No riser is used. Assume uniform cooling in all directions. (A) 48.32mm (B) 49.90mm (C) 49.94mm (D) 49.96mm Answer: (A) Common Data Questions 48 & 49 In an experimental set-up, air flows between two stations P and Q adiabatically. The direction of f depends on the pressure and renaperature conditions maintained at P and Q. The conditions at station P 150kPa and 350K. The temperature at station Q is 300K. The following are the properties and relations pertaining to air: Specific heat at constant pressure, $C_p = 1.005 \text{kJ/kgK}$ ; Specific heat at constant volume, $C_q = 0.718 \text{kJ/kgK}$ ; Specific heat at constant, $R = 0.287 \text{kJ/kgK}$ ; Enthalpy, $h = C_p T$ Internal energy, $u = C_s T$ 48. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at station Q is close to (A) 50 (B) 87 (C) 128 (D) 150 Answer: (B) 49. If the pressure at station Q is 50kPa, the change in entropy $(S_q - S_r)$ in kJ/kgK is (A) $-0.155$ (B) 0 (C) $0.160$ (D) $0.355$ Answer: (C)	(C) $P-3$ , $Q-2$ , $R-4$ , $S-1$ (D) $P-2$ , $Q-3$ , $R-1$ , $S-4$ <b>inswer:</b> (A) <b>7.</b> A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric solidification of 4% and 6% respectively. No riser is used. Assume uniform cooling in all directions. side of the cube after solidification and contraction is <ul> <li>(A)</li> <li>48.32mm</li> <li>(B)</li> <li>49.90mm</li> <li>(C)</li> <li>49.94mm</li> <li>(D)</li> <li>49.96mm</li> <li><b>Assume:</b></li> <li>(A)</li> <li><b>Assume:</b></li> <li>(A)</li> <li><b>Common Data Questions 48 &amp; 49</b></li> <li>In an experimental set-up, air flows between two stations P and Q adiabatically. The direction of 1 depends on the pressure and temperature conditions maintained at P and Q. The conditions at station F 150kPa and 350K. The temperature at station Q is 300K.</li> <li>The following are the properties and relations pertaining to air:</li> <li>Specific heat at constant pressure, <math>C_p = 1.005kJ/kgK</math>;</li> <li>Specific heat at constant volume, <math>C_v = 0.718kJ/kgK</math>;</li> <li>Characteristic gas constant, <math>R = 0.287kJ/kgK</math></li> <li>Enthalpy, <math>h = C_pT</math></li> <li>Internal energy, <math>u = C_vT</math></li> <li><b>8.</b> If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at stating is close to         <ul> <li>(A)</li> <li>50</li> <li>(B)</li> <li>(C)</li> <li>(D)</li> <li>(D)</li> <li>(D)</li> <li>(D)</li> </ul> <b>9.</b> If the pressure at station Q is 50kPa, the change in entropy (<math>S_Q - S_v</math>) in <math>kJ/kgK</math> is             <ul> <li>(A)</li> <li>(D)</li> <li>(D)</li> <li>(D)&lt;</li></ul></li></ul>	(C) $P-3$ , $Q-2$ , $R-4$ , $S-1$ (D) $P-2$ , $Q-3$ , $R-1$ , $S-4$ Answer: (A)	netric_sol
Answer: (A)         47. A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric side of the cube after solidification and contraction is         (A) 48.32mm       (B) 49.90mm       (C) 49.94mm       (D) 49.96mm         Answer: (A)         Common Data Questions 48 & 49         In an experimental set-up, air flows between two stations P and Q adiabatically. The directions at station P 150kPa and 350K. The temperature at station Q is 300K. The following are the properties and relations pertaining to air:         Specific heat at constant pressure, C <sub>p</sub> = 1.005kJ / kgK;         Specific heat at constant volume, C <sub>v</sub> = 0.718kJ / kgK;         Characteristic gas constant, R = 0.287kJ / kgK         Enthalpy, h = C <sub>p</sub> T         Internal energy, u = C <sub>v</sub> T         18. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at station Q is close to <ul> <li>(A) 50</li> <li>(B) 87</li> <li>(C) 128</li> <li>(D) 150</li> </ul> 41. Station Q is 50kPa, the change in entropy (S <sub>0</sub> - S <sub>p</sub> ) in kJ/kgK is         (A) -0.155       (B) 0       (C) 0.160       (D) 0.355	A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric s contraction of 4% and 6% respectively. No riser is used. Assume uniform cooling in all directions. side of the cube after solidification and contraction is <ul> <li>(A) 48.32mm</li> <li>(B) 49.90mm</li> <li>(C) 49.94mm</li> <li>(D) 49.96mm</li> <li>(E) Common Data Questions 48 &amp; 49</li> <li>In an experimental set-up, air flows between two stations P and Q adiabatically. The direction of flowing are the properties and relations pertaining to air:</li> <li>Specific heat at constant volume, <math>C_v = 0.718kJ/kgK</math>;</li> <li>Characteristic gas constant, R = 0.287kJ/kgK</li> <li>Enthalpy, h = <math>C_pT</math></li> <li>Internal energy, u = <math>C_sT</math></li> <li>8. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static is close to</li> <li>(A) 50</li> <li>(B) 87</li> <li>(C) 128</li> <li>(D</li></ul>	Answer: (A)	netric sol
<ul> <li>P. A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric side of the cube after solidification and contraction is is de of the cube after solidification and contraction is (A) 48.32mm (B) 49.90mm (C) 49.94mm (D) 49.96mm (D) 4</li></ul>	<ul> <li>7. A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric s contraction of 4% and 6% respectively. No riser is used. Assume uniform cooling in all directions. side of the cube after solidification and contraction is <ul> <li>(A) 48.32mm</li> <li>(B) 49.90mm</li> <li>(C) 49.94mm</li> <li>(D) 49.96mm</li> </ul> </li> <li>Answer: (A) <ul> <li>Common Data Questions 48 &amp; 49</li> </ul> </li> <li>In an experimental set-up, air flows between two stations P and Q adiabatically. The direction of 1 depends on the pressure and temperature conditions maintained at P and Q. The conditions at station F 150kPa and 350K. The temperature at station Q is 300K.</li> <li>The following are the properties and relations pertaining to air: Specific heat at constant pressure, C<sub>p</sub> = 1.005kJ / kgK;</li> <li>Characteristic gas constant, R = 0.287kJ / kgK</li> <li>Enthalpy, h = C<sub>p</sub>T</li> <li>Internal energy, u = C<sub>v</sub>T</li> </ul> 8. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static Q is close to <ul> <li>(A) 50</li> <li>(B) 87</li> <li>(C) 128</li> <li>(D) 150</li> </ul> <li>9. If the pressure at station Q is 50kPa, the change in entropy (S<sub>0</sub> - S<sub>p</sub>) in kJ/kgK is <ul> <li>(A) -0.155</li> <li>(B) 0</li> <li>(C) 0.160</li> <li>(D) 0.355</li> </ul> </li>		netric sol
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Answer:       (A)         Common Data Questions 48 & 49         In an experimental set-up, air flows between two stations P and Q adiabatically. The direction of f depends on the pressure and temperature conditions maintained at P and Q. The conditions at station P 150kPa and 350K. The temperature at station Q is 300K. The following are the properties and relations pertaining to air:         Specific heat at constant pressure, $C_p = 1.005 \text{ kJ/kgK}$ ;         Specific heat at constant volume, $C_v = 0.718 \text{ kJ/kgK}$ ;         Characteristic gas constant, $R = 0.287 \text{ kJ/kgK}$ ;         Enthalpy, $h = C_p T$ Internal energy, $u = C_v T$ 8.       If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at station Q is close to         (A)       50       (B)       87       (C)       128       (D)       150         9.       If the pressure at station Q is 50kPa, the change in entropy $(S_q - S_p)$ in kJ/kgK is       (A)       -0.155       (B)       0       (C)       0.160       (D)       0.355	Answer:       (A)         Common Data Questions 48 & 49         In an experimental set-up, air flows between two stations P and Q adiabatically. The direction of fdepends on the pressure and temperature conditions maintained at P and Q. The conditions at station F 150kPa and 350K. The temperature at station Q is 300K. The following are the properties and relations pertaining to air:         Specific heat at constant pressure, $C_p = 1.005 \text{ kJ/kgK}$ ;         Specific heat at constant volume, $C_v = 0.718 \text{ kJ/kgK}$ ;         Characteristic gas constant, $R = 0.287 \text{ kJ/kgK}$ ;         Characteristic gas constant, $R = 0.287 \text{ kJ/kgK}$ ;         Internal energy, $u = C_v T$ 8.       If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at statical Q is close to         (A)       50       (B)       87       (C)       128       (D)       150         9.       If the pressure at station Q is 50 kPa, the change in entropy $(S_q - S_p)$ in kJ/kgK is       (A)       -0.155       (B)       0       (C)       0.160       (D)       0.355	side of the cube after solidification and contraction is	
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Internal energy, $\mathbf{u} = \mathbf{C}_{v}\mathbf{T}$ <b>8.</b> If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static Q is close to (A) 50 (B) 87 (C) 128 (D) 150 <b>Answer: (B)</b> <b>19.</b> If the pressure at station Q is 50kPa, the change in entropy $(\mathbf{S}_{Q} - \mathbf{S}_{P})$ in kJ/kgK is (A) -0.155 (B) 0 (C) 0.160 (D) 0.355	Internal energy, $\mathbf{u} = \mathbf{C}_{v}\mathbf{T}$ 8. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static Q is close to (A) 50 (B) 87 (C) 128 (D) 150 Answer: (B) 9. If the pressure at station Q is 50kPa, the change in entropy $(\mathbf{S}_{Q} - \mathbf{S}_{P})$ in kJ/kgK is (A) -0.155 (B) 0 (C) 0.160 (D) 0.355	Characteristic gas constant, $R = 0.287 kJ / kgK$	
Internal energy, $\mathbf{u} = \mathbf{C}_{v}\mathbf{T}$ <b>18.</b> If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at stating is close to (A) 50 (B) 87 (C) 128 (D) 150 <b>Answer: (B)</b> <b>19.</b> If the pressure at station Q is 50kPa, the change in entropy $(\mathbf{S}_{Q} - \mathbf{S}_{P})$ in kJ/kgK is (A) -0.155 (B) 0 (C) 0.160 (D) 0.355	Internal energy, $\mathbf{u} = \mathbf{C}_{v}\mathbf{T}$ 8. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static Q is close to (A) 50 (B) 87 (C) 128 (D) 150 Answer: (B) 9. If the pressure at station Q is 50kPa, the change in entropy $(\mathbf{S}_{Q} - \mathbf{S}_{P})$ in kJ/kgK is (A) -0.155 (B) 0 (C) 0.160 (D) 0.355	Enthalpy, $h = C_n T$	
<b>18.</b> If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static Q is close to(A) 50(B) 87(C) 128(D) 150(A) some result(B)(C) 128(D) 150(B)(B) 9.(C) 128(D) 150(B)(C) 0.160(D) 0.355	<ul> <li>8. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at static Q is close to <ul> <li>(A) 50</li> <li>(B) 87</li> <li>(C) 128</li> <li>(D) 150</li> </ul> </li> <li>9. If the pressure at station Q is 50kPa, the change in entropy (S<sub>Q</sub> - S<sub>P</sub>) in kJ/kgK is <ul> <li>(A) -0.155</li> <li>(B) 0</li> <li>(C) 0.160</li> <li>(D) 0.355</li> </ul> </li> </ul>		
Q is close to       (A) 50       (B) 87       (C) 128       (D) 150         Answer: (B)       (B)       (B)       (C) 128       (D) 150         (B)       (B)       (C) 128       (D) 150         (B)       (C) 128       (D) 150         (C)       (C) 128       (D) 150         (D)       (D)       (D) 150         (D)       (D)       (D)         (D)       (D)       (D)         (A)       -0.155       (B)       0       (C)       0.160       (D)       0.355	Q is close to       (B)       87       (C)       128       (D)       150         (A)       50       (B)       87       (C)       128       (D)       150         (A)       -0.155       (B)       0       (C)       0.160       (D)       0.355		Pa at statio
(A) 50       (B) 87       (C) 128       (D) 150         Answer:       (B)       (B)       (C) 128       (D) 150         19.       If the pressure at station Q is 50kPa, the change in entropy $(S_Q - S_P)$ in kJ/kgK is       (A) -0.155       (B) 0       (C) 0.160       (D) 0.355	(A) 50       (B) 87       (C) 128       (D) 150         (B)       (B)       (C)       (C) </td <td></td> <td>i u ui stuti</td>		i u ui stuti
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Answer: (C)	Answer: (C)	(A) -0.155 (B) 0 (C) 0.160 (D) 0.355	
		Answer: (C)	
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**|ME-GATE-2011|** www.gateforumonline.com **Common Data Questions: 50 & 51** One unit of product  $P_1$  requires 3 kg of resource  $R_1$  and 1kg of resource  $R_2$ . One unit of product  $P_2$ requires 2kg of resource  $R_1$  and 2kg of resource  $R_2$ . The profits per unit by selling product  $P_1$  and  $P_2$  is Rs.2000 and Rs.3000 respectively. The manufacturer has 90kg of resource  $R_1$  and 100kg of resource  $R_2$ . **50.** The unit worth of resource  $R_2$  i.e., dual price of resource  $R_2$  in Rs. Per kg is (A) 0 (B) 1350 (C) 1500 (D) 2000 **(A)** Answer: The manufacturer can make a maximum profit of Rs. 51. (A) 60000 (B) 135000 150000 (C) (D) 200000 Answer: **(B)** Statement for Linked Answer Questions: 52 & 53 A triangular-shaped cantilever beam of uniform-thickness is shown in the figure. The Young's modulus of the material of the beam is E. A concentrated load P is applied at the free end of the beam. Ρ b 52. The area moment of inertia about the neutral axis of a cross-section at a distance x measured from the free end is  $\frac{bxt^3}{12\ell}$ (C)  $\frac{bxt^3}{24\ell}$ (D)  $\frac{xt^3}{12}$ bxt (B) (A) Answer: **(B)** 



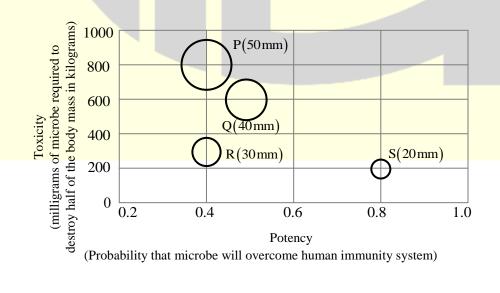
GATEFORUM |ME-GATE-2011| www.gateforumonline.com **GENERAL APTITUDE** Q. No. 56 - 60 Carry One Mark Each **56.** Choose the word from the options given below that is most nearly opposite in meaning to the given word: "Amalgamate" (B) split (C) collect (A) merge (D) separate Answer: **(D)** Which of the following options is the closest in the meaning to the word below: 57. "Inexplicable" (A) Incomprehensible (B) Indelible (C) Inextricable (D) Infallible Answer: (A) If Log(P) = (1/2)Log(Q) = (1/3)Log(R), then which of the following options is TRUE? **58.** (A)  $P^2 = Q^3 R^2$  (B)  $Q^2 = PR$  (C)  $Q^2 = R^3 P$  (D)  $R = P^2 Q^2$ Answer: **(B)** Choose the most appropriate word(s) from the options given below to complete the following sentence: **59.** "I contemplated Singapore for my vacation but decided against it." (A) to visit (B) having a visit (C) visiting (D) for a visit Answer: **(C)** 

60. Choose the most appropriate word from the options given below to complete the following sentence: "If you are trying to make a strong impression on your audience, you cannot do so by being understated, tentative or \_\_\_\_\_."

# (A) hyperbolic (B) restrained (C) argumentative (D) indifferentAnswer: (B)

C	<b>GATEF</b> Engineerir	ORUM 19 Success	ME-GATE	-2011	www.gateforumonline.com								
<b>Q. No. 61 to 65 Carry Two Marks Each</b>													
61.	A container originally contains 10 litres of pure spirit. From this container I litre of sprit is replaced wit												
	1 litre of water. Subsequently, 1 litre of the mixture is again replace with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container ?												
	(A)	•	(B) 7.84 litres	(C) 7 litres	(D) 7.29 litres								
Ansv	Answer: (D)												
62.	Few school curricula include a unit on how to deal with bereavement and grief, and yet all students at some point in their lives suffer from losses through death and parting. Based on the above passage which topic would not be included in a unit on bereavement?												
	<ul><li>(A)</li><li>(B)</li><li>(C)</li><li>(D)</li></ul>	How to write a letter of co What emotional stages are What are the leading caus How to give support to a g	e passed through in t es of death are	he healing process									
Ans	wer:	( <b>C</b> )											

63. P, Q, R and S are four types of dangerous microbes recently found in a human habitat.



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	The area of each circle with its diameter printed in brackets represents the growth of a single microl											
	survi	surviving human immunity system within 24 hours of entering the body. The danger to human beings										
	varie	varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure										
	abov	above: A pharmaceutical company is contemplating the development of a vaccine against the mos										
	dang	dangerous microbe. Which microbe should the company target in its first attempt ?										
	(A)	Р		(B) Q		(C)	R		(D) S			
Ansy	wer:	<b>(D</b> )										
64.	The	variable o	cost (V) of	manufacturi	ng a produ	uct varies	accordi	ing to the equ	uation v	v = 4q, where q is the		
										th q according to the		
	•	• •			· •			inimize the to				
	(A)	5	<b>1</b>	(B) 4		(C)	7		(D) 6			
				(D) +		(0)	7		(D) 0			
Ansv	wer:	(A)										
65.										some pending orders		
										n clear all the orders.		
										the $10^{\text{th}}$ day. What is		
		hinimum	number of		ed so that					end of the 5 <sup>th</sup> day?		
	(A)	4		(B) 5		(C)	6		(D) 7			
Ansv	wer:	( <b>C</b> )										
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