(Al	FFILIA	TED TO APJ ABDUL KALAM TECHNOLOGI	CAL U	NIVERSITY, THIRUVANANTHAPURAM)					
		SIXTH SEMESTER B.TECH DEGREE	EXA	MINATION (R), MAY 2023					
		MECHANICAL EN	GINE	ERING					
(2020 SCHEME)									
urse	Code	: 20MET308							
ourse	Name	e : Comprehensive Course Work							
ax. Ma	arks :	50	<b>Duration : 75 Minutes</b>						
PART A									
		(Answer all questions. Each q	luest	ion carries 1 mark)					
	The	region between the separation stream	amlin	e and the boundary surface of the					
	soli	d body is known as	F						
	A.	Wake	B.	Lift					
	C.	Drag	D.	Boundary Layer					
	The	Darcy-Weisbach equation is comm	only i	used to calculate					
	А.	Pressure drop in a pipe	В.	Volumetric flow rate in a pipe					
	C.	Reynolds number in a pipe	D.	Velocity distribution in a pipe					
	Ber	noulli's equation in fluid dynamics o	descr	ibes the conservation of					
	А.	Mass	В.	Energy					
	C.	Momentum	D.	Viscosity					
	Nev	vtonian fluids are characterized by							
	А.	Constant viscosity regardless of shear rate	В.	Increasing viscosity with increasing shear rate					
	C.	Decreasing viscosity with increasing shear rate	D.	No relation between viscosity and shear rate					
	Eu	ler's dimensionless number relates	the fo	ollowing					
	А.	inertial force and gravity	В.	viscous force and buoyancy force					
	C.	viscous force and inertial force	D.	pressure force and inertial force					
	Stre	eamlines in fluid flow represent							
	А.	The path followed by fluid particles over time	В.	b) The instantaneous velocity of fluid particles					
	C.	The local pressure distribution in the fluid	D.	The energy transfer in the fluid					
Fe-C alloy containing less than 0.8% carbon is called									
	А.	High speed steel	В.	Hyper- eutectoid steel					
	C.	Hypo-eutectoid steel	D.	Cast iron					
Which mechanism of plastic deformation involves the movement of dislocations									
	А.	Slip	В.	Twinning					
	C.	Creep	D.	Diffusion					

## SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

Co

Register No.: .....

Co

Ма

## 917A2

Total Pages : 4

Name : .....

 $\mathbf{F}$ 

1

2

3

4

5

6

7

8

9	defines the relationship between shear stress, the applied stress, and					
	the orientation of the slip system.					
	A. Fick's law	В.	Bragg's Law			
	C. Hall Petch equation	D.	Schmid's law			
10	Which source is responsible for the multiplication of dislocations in a crystal?					
	A. Forest dislocation	В.	Frank-Read source			
	C. Grain boundary	D.	Dislocation line			
11	How many phases can exist at equilibrium in a binary system according to Gibbs' phase rule?					
	A. 1	В.	2			
	C. 3	D.	4			
12	Which Miller indices represent a crystal plane parallel to the x-axis, passing through $(1, 2, 3)$ ?					
	A. (123)	В.	(3 2 1)			
	C. (1 3 2)	D.	(2 1 3)			
13 Which statement describes a quasi-static process?						
	A. It occurs at an infinitely slow rate.	В.	It involves rapid energy transfer.			
	C. It cannot reach thermal equilibrium.	D.	It cannot reach thermal equilibrium.			
14	A quasi-static process is one in which all the states through which a system					
	passes are very close to	Ð	•••••			
	A. equilibrium state	В.	original state			
	C. same temperature	D.	each other			
15	Which type of system exchanges energy but not matter with its surroundings?					
	A. Closed system	В.	Open system			
	C. Isolated system	D.	Adiabatic system			
16	What is the term used to describe the process where a system undergoes a series of changes and returns to its initial state?					
	A. Process	В.	Cycle			
	C. Equilibrium	D.	Path function			

17 Consider the below diagram of heat transfer and work transfer for a system. What will be the first law equation for the below system?



	А.	$(Q_1 - Q_2) = \Delta E - (W_2 + W_3 - W_1)$	В.	$(Q_1 + Q_2) = \Delta E + (W_2 - W_3 + W_1)$		
	C.	$(Q_1 - Q_2) = \Delta E + (W_2 + W_3 - W_1)$	D.	none of the above		
18	Which law states that it is impossible to construct a device that operates in a					
	A.	Zeroth Law of Thermodynamics	B.	First Law of Thermodynamics		
	C	Kelvin-Planck Statement	D.	Clausius Statement		
19	In a	four high rolling mill out of the for	ur roll	s present		
19	Δ	one is working roll and three are	R	Two are working rolls and two are		
	11.	backing up rolls	D.	backing up rolls		
	C.	three are working rolls and one is backing up roll	D.	All of the four are working rolls		
20	The temperature of carburizing flame in gas welding is that of oxidizing					
	flar	ne	P			
	A.	lower	В.	higher		
	С.	equal	D.	unrelated		
21	Which one among the following welding processes uses non-consumable electrode?					
	А.	Gas metal arc welding	В.	Submerged arc welding		
	C.	Gas tungsten arc welding	D.	Flux coated arc welding		
22	In f	usion welding process, within heat a	affecte	ed zone (HAZ) the work material		
	und	lergoes	ъ			
	А.	micro structural changes but	В.	neither melting nor micro		
	C.	both melting and micro	D.	melting and retains the original		
	0.	structural after solidification	Ъ.	micro structure after solidification		
23	Ris	ser is designed so as to				
	А.	minimize the time of pouring	В.	freeze before the casting freezes		
	C.	freeze at the same time as the casting	D.	freeze after the casting freezes		
24	The heat generated (H) in resistance welding is expressed by					
	А.	IRT <sup>2</sup>	В.	IR <sup>2</sup> T		
	C.	I <sup>2</sup> RT	D.	2IRT		
25	Corioli's component of acceleration is considered in case of					
	А.	quick return motion mechanism	В.	Slider crank mechanism		
	C.	Four bar mechanism	D.	toggle mechanism		
26	The	e type of quick return mechanism en	nploy	ed mostly in shaping machines is:		
	А.	DC reversible motor	В.	Fast and loose pulleys		
	C.	Whitworth motion	D.	Slotted link mechanism		
27	A point 'B' on a rigid link AB moves with respect to A with an angular velocity $\omega$ .					
	If $a^{r}$ and $a^{t}$ are the radial and tangential components of total acceleration of B					
	wit	h respect to A, then angular accelera	ation	of link AB is		
	А.	ω/AB	В.	a <sup>r</sup> /AB		
	C.	a <sup>t</sup> /AB	D.	$\sqrt{(a^r)^2 + (a^t)^2/AB}$		
28	Which among the following constitutes a higher pair?					
	А.	a ball and socket joint	В.	toothed gearing		
	C.	universal joint	D.	bicycle wheels turning on their axles		

29	When a slider moves on a fixe instantaneous centre lies	d lir	k having a curved surface, their						
	A. on their point of contact	В.	at the centre of curvature						
	C. at centre of the circle	D.	at the pin joint						
30	A body in motion will be subjected to Co	orioli'	s acceleration when that body is						
	A. in plane rotation with variable velocity	В.	in plane translation with variable velocity						
	C. in plane motion which is a resultant of plane translation and rotation	D.	restrained to rotate while sliding over another body						
	PART I	3							
	(Answer all questions. Each question carries 2 marks)								
31	Water flows through a pipe with a diameter of 0.1 m. If the flow velocity is $1 \text{ m/s}$ , what is the flow rate of the water?								
	A. 0.0314 m <sup>3</sup> /s	В.	0.0314 m³/s						
	C. 3.14 m <sup>3</sup> /s	D.	31.4 m³/s						
32	An object with a volume of $0.1 \text{ m}^3$ is sulfluid is 800 kg/m <sup>3</sup> , what is the buoyant	omerg force	ged in a fluid. If the density of the acting on the object?						
	A. 800 N	в. Б							
22	C. ON		U.S.N						
33	stress experienced by the material?	D GP	$200 \text{ MP}_{2}$						
	A. 100 MPa	D. D	200 MPa 800 MPa						
24	C. 400 MPa	D.	000 MFa						
34	spacing between (1 1 1) planes in this crystal?								
	$\begin{array}{c} \text{A.} & 0.23 \text{ mm} \\ \text{C.} & 0.50 \text{ nm} \end{array}$	D. П	0.71 nm						
35	In the study of phase diagrams, the m	D.	vich helps to calculate the relative						
55	proportions of liquid and solid material present in the mixture at any given								
	A. Hume-Rothery rule	В.	Empirical rule						
	C. Gibb's phase rule	D.	Lever rule						
36	A steam turbine receives steam steadily kJ/kg and discharges at 1 bar with an o is 250 kJ/kg. The changes in kinetic and The heat transfer from the turbine casin A. 0 kJ C. 150 kJ	at 10 entha id pot ng to B. D.	) bar with an enthalpy of 3000 lpy of 2700 kJ/kg. The work output ential energies are negligible. the surroundings is equal to 50 kJ 250 kJ						
37	Destructive weld testing methods includ 1. Impact testing 2. fillet weld break test 3. transverse tension test 4. guided bend test A. 1, 2 and 3 C. 1, 2 and 4	le B. D	2, 3 and 4 All the above						
	······································	Ъ.							

- 38 Thermit, used in Thermit welding process is a mixture of ......
  - A. Charcoal and Aluminium
- B. Aluminium and Iron oxide
- C. Charcoal and Iron oxide
- D. Charcoal, Aluminium and Iron oxide
- 39 Which of the following statements are correct?
  - 1. Inversions of a mechanism are created-by fixing different links, one at a time.
  - 2. Geneva mechanism is an intermittent motion device.
  - 3. Gruebler's criterion assumes mobility of a planar mechanism to be one.
  - 4. Transmission angle is the angle between coupler and input link.
  - A. 1, 2 and 3 B. 2, 3 and 4
  - C. 1, 2 and 4 D. All the above The degrees of freedom for the mechanism shown below is

40

A.

C.

-1

1

B. 0 D. 2