(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU

ARE ASKED TO DO SO)

SET-Z

10005

M.Phil./Ph.D./URS-EE-2019

SUBJECT: Mechanical Engineering

			Sr. No
Time: 11/4 Hours	Ma	ax. Marks : 100	Total Questions: 100
Roll No. (in figures)	(in	words)	
Name		_ 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.

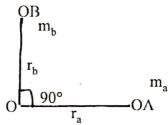
- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging 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 will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E.Mail within 24 hours of uploading the same on the University Website. 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 will be no negative marking. 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.

MPH/PHD/URS-EE-2019/(Mech. Engg.)(SET-Z)/(A)

	A cylindrical tank winner radius of the maximum in-plane sl	tank is 2 m	and it has	h compressed air wall thickness o	at a pressure of 50 f 10 mm. The ma	0 kPa. The gnitude of
	(1) 22	(2) 24	(3)	25	(4) 29	
2.	In a machining open obtained is:	ration, if the	generatrix an	d directrix both	are straight lines, t	he surface
	(1) Cylindrical	(2) Helica	1 (3)	Plane	(4) Surface of re	volution
3.	A single-degree-free amplitude and freque damping factor is (amplitude of vibration)	ency w along 0.2 and the on (in m) is a	the axis of the undamped na pproximately:	e spring. The stiff tural frequency	ness of the spring is is 10w. At steady	150 N/m,
	(1) 0.05	(2) 0.07	(3)	0.70	(4) 0.90	h e
4.	A hollow shaft of maximum permissible times the outer diamethe shaft is:	le angle of t	wist in the sha	ft is 1°. The inne	er diameter of the sl	haft is 0.7
	(1) 44.5212 mm	(2) 54.521	2 mm (3)	64.5212 mm	(4) 48.5212 mm	
5.	The atomic packing				structure is:	
	(1) 0.68	(2) 0.53	(3)	0.89	(4) 0.87	
6.	A horizontal cantile 200 N.m ² is subject figure. The magnitudecimal place):	ted to an app	licd moment N	$I_{\Lambda} = 1.0 \text{ N-m at}$	the free end as show	wn in the
	(1) 2.5	(2) 1.5	(3)	3.5	(4) 0.5	
		. 200	-1.	0 m — N	*	
7.	A wire of circular control by application of put the wire is 100 GPa (1) 60	ire bending m	oments at its e im tensile stres	nds. The Young's	modulus of the ma	s 1.0 mm aterial of
8.	A small ball of mas with a stationary ba mass ball after the in	s 1 kg movin ll of mass 2 k	g with a velocing. The impact	ty of 12 m/s unde	ergoes a direct central. The speed (in m/s	ll impact) of 2 kg
	(1) 4	(2) 8	(3)	6	(4) 2	
9	pressure of the gas	is 2 MPa. The	maximum she	ar stress (in MPa)		The gage
3./(1)**	(1) 35	(2) 70		140	(4) 280	
WIPI	//PHD/URS-EE-2019/	(wiech. Engg	.)-(SET-Z)/(A)	v s ^m		P. T. O.

10.	In a spring-mass system, the mass is m and the spring constant is k. The critical damping
	coefficient of the system is 0.1 kg/so In another spring-mass system, the mass is 2m and the
	spring constant is 8k. The critical damping coefficient (in kg/s) of this system is:

- (1) 0.6
- (2) 0.3
- (3) 0.4
- (4) 0.8
- 11. Two masses A and B having mass m_a and m_b , respectively, lying in the plane of the figure shown, are rigidly attached to a shaft which revolves about an axis through O perpendicular to the figure. The radii of rotation of the masses m_a and m_b are r_a and r_b respectively. The angle between lines OA and OB is 90°. If $m_a = 10$ kg, $m_b = 20$ kg, $r_a = 200$ mm and $r_b = 400$ mm, then the balance mass to be placed at a radius of 200 mm is (kg --- round off to two decimal places):
 - (1) 41.23
- (2) 42.23
- (3) 40.23
- (4) 43.23



12. The thickness of a sheet is reduced by rolling (without any change in width) using 600 mm diameter rolls. Neglect elastic deflection of the rolls and assume that the coefficient of friction at the roll-work piece interface is 0.05. The sheet enters the rotating rolls unaided. If the initial sheet thickness is 2 mm, the minimum possible final thickness that can be produced by this process in a single pass is (mm -- round off to two decimal places):

- (1) 1.35
- (2) 1.25
- (3) 1.45
- (4) 1.15
- 13. Consider a linear rectangular thin sheet of metal, subjected to uniform uniaxial tensile stress of 100 MPa along the length direction. Assume plane stress conditions in the plane normal to the thickness. The Young's modulus E = 200 MPa and Poisson's ratio v = 0.3 are given. The principal strains in the plane of the sheet are:
 - (1) (0.5, 0.0)
- (2) (0.35, -0.15)
- (3) (0.5, -0.5)
- (4) (0.5, -0.15)
- 14. Sphere 1 with a diameter of 0.1 m is completely enclosed by another sphere 2 of diameter 0.4 m. The view factor F_{12} is:
 - (1) 0.25
- (2) 0.0625
- (3) 1.0
- (4) 0.5

15. The state of stress at a point in a component is represented by a Mohr's circle of radius 100 MPa centered at 200 MPa on the normal stress axis. On a plane passing through the same point, the normal stress is 260 MPa. The magnitude of the shear stress on the same plane at the same point is (MPa):

- (1) 80
- (2) 90
- (3) 60
- (4) 70
- 16. Endurance limit of a beam subjected to pure bending decreases with:
 - (1) Increase in the surface roughness and increase in the size of the beam
 - (2) Decrease in the surface roughness and decrease in the size of the beam(3) Decrease in the surface roughness and increase in the size of the beam
 - (4) Increase in the surface roughness and decrease in the size of the beam

MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(A)

17.	Which of the following			6.4		0	
17.	(1) Soderberg	ng is the most conserv				1?	
	(3) ASME Elliptic			Modified Goodn	nan		
	•		(4)	Gerber			
18.		olted joint is used to:					
	(1) Strain harden the	e bolt head	(2)	Decrease stiffnes	ss of t	the bolted joint	
	(3) Increase stiffnes	s of the bolted joint	(4)	Prevent yielding	of the	e thread root	
19.	For an Oldham coup correct?	ling used between two	sha	fts, which among	the fo	ollowing stater	nents are
	I. Torsional load is	s transferred along shall	ft axi	s.			
	Il. A velocity ratio	of 1:2 between shafts i	s obt	ained without usin	ng gea	ars	
	III. Bending load is	transferred transverse	to sha	aft axis.			
	IV. Rotation is trans	ferred along shaft axis	:				
	(1) I and II	(2) I and IV	(3)	II and III	(4)	II and IV	
20.	A self-aligning ball to If the equivalent radii (1) Below 0.5	pearing has a basic dyn al load on the bearing (2) 0.5 to 0.8	is 45	load rating (c ₁₀ , f kN, the expected 0.8 to 1.0	life (i	⁶ revolutions) on 10 ⁶ revolution Above 1.0	of 35 kN. ons) is :
			,		, ,		. 0 1
21.	loses 20% of its in acceleration due to	vertically up from groupact velocity after ear gravity is 10 m/s ² and to complete rest on the	ach c d tha	collision with the at air resistance is	grou s neg	nd. Assuming ligible, the ma	
	(1) 1	(2) 2	(3)	4	(4)	6	
22.	 Increases linearl Decreases linear 	ly with the true strain nearly and then decrea					
23.	The spring constant of	of a helical compression				d on:	
	(1) Coil diameter	1	` '	Material strength	1		
	(3) Number of activ	e turns	(4)	Wire diameter			
24.	method of riser design	th diameter of 200 mm gn. Assume that the bo f the diameter of the ri	ttom ser is	surface of cylindrequal to its heigh	rical r	iser does not c in the height of	ontribute
	(1) 150	(2) 200	(3)	100	(4)	125 .	
		A COMMINICA	MA				PTO

25.		aving square cross-sec e tip deflection decreas		ected to an end load. If a is
	(1) 19%	(2) 29%	(3) 41%	(4) 50%
26.	through the wall is 10	000 Wand the surroun	ding temperature is 25	K. The rate of heat transfer 5°C. Assuming no generation for through the wall is: (4) 244
27.	Air in a room is at 35 The saturation pressu of dry air) is:	5°C and 60% relative hare of water at 35°C is	numidity (RH) The pro 5.63 kPa. The humidi	essure in the room is 0.1 MPa ty ratio of the air (in grain/kg
	(1) 21.74	(2) 22.20	(3) 25.17	(4) 20.37
28.	(1) Holds because th(2) Holds because th(3) Holds because th	ne flow is incompressib	ble	rnoulli equation :
29.		e turbine exit are correct		i) are correct
30.	power of 10 kW who sensed by the dynam	en the speed of rotation ometer is:	ne crank shaft of an land of the shaft is 400 ra (3) 35	I.C. engine measures a brake d/s. The shaft torque (in N-m) (4) 45
31.	cycle is 1000 kPa. Fo	or air, assume specific learner and temperature a cetively, then the spec	ciency of 0.5 and the neat ratio y = 1.4 and s at the beginning of th	mean effective pressure of the specific gas constant R = 0.287 the compression stroke are 100 of the cycle is (kJ/kg round (4) 1008.8
32.	running at 3000 rpm radial with respect to	. The entry of the liqu	aid into the pump is a sare neglected, then t	consumes 2 kW power while xial and exit from the pump is he mass flow rate of the liquid (4) 9.106
ADIL	DUB/IIDS FF 2010/	Moch Engg)-(SET-2	(V/(A)	

					•,		
	33.	A through hole is drilled diameter 10 mm, at a fenergy required for cutter-round off to two decired.	eed of 0.25 mm/reving this material is (v and	l a spindle speed	of 12	00 rpm. If the specific
		(1) 276.9 (2	2) 274.89	(3)	278.9	(4)	277.89
	34.	One-dimensional stead sectional area varies li generation in the solid a of temperature.	nearly in the dire	ction	of heat transfer	. Ass	ume there is no heat
		The temperature distribu	ntion in the solid is:		,		
		(1) Ouadratic (2	2) Exponential	(3)	Logarithmic	(4)	Linear
	35.	Which one of the follothermal efficiency and r	educes the moisture	con	ent of the steam a	t the t	urbine outlet:
		(1) Decreasing the cond	•		Increasing the bo		*
		(3) Decreasing the boil	er pressure.	(4)	Increasing the tu	rbine i	nlet temperature.
	36.	Water enters a circular number $R_{cD} = 500$. The at the exit. The Reynold	velocity profile at t	he ir	let of the pipe is		
•		(1) 450 (2	2) 550	(3)	500	(4)	500
	37.	Ambient air is at a prohumidity. The saturation g/kg of dry air) is (corre	n pressure of water a	at 30° accs	°C is 4.24 kPa. Th) :	e spec	ific humidity of air (in
		(1) 16.24 (2)	17.24	(3)	18.24	(4)	15.24
	38.	The peak wavelength of um. If the peak waveler K) of the black body is:	igth of emitted radia				
		(1) 500 (2) 1000	(2)	4000	(4)	8000
	39.	Select the correct statem	ent for 50% reaction	n sta	ge in a steam turbi	ne.	
		(1) The rotor blade is sy					
		(2) The stator blade is s			1. 0		
		(3) The absolute inlet fl(4) The absolute exit flo					
		•					1
	40.	Which one of the follow (1) Its pressure is less the					
		(2) Its temperature is le					
		(3) Its volume is less th					
		(4) Its enthalpy is less t					-
M	(PH/P	PHD/URS-EE-2019/(Med		•		ar ti artiñ	P. T. O.
			007	, ,	20, 20, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1		

41.	Which one of the follo(1) Centrifugal pump	owing is NOT a rotatin (2) Gear pump	_	achine? Jet pump	(4)	Vane pump	
42.		0°C condenses on the l'he value of the Log M (2) 58.46	Ican		ereno		
43.	4m, respectively. At velocity of the slide accuracy) of the crank	*	onne tude	cting rod is perpe of angular veloc	ndic ity (ular to the crant upto 3 decimal	k, if the
44.		(2) 0.267 indrical cup with diation in the sheet thickn	mete		rawn	from .circular	
	(1) 27.12		(3)	29.49	(4)	33.41	
45.		and $21\% O_2$ on a mole ichiometrically. Assume products is:			tion	of methane, th	
	(1) 70	(2) 73.8	(2)	75	(4)	79.8	
46.	Heat and Work are: (1) Intensive propert (3) Point functions	ics .		Extensive proper Path functions	ties		
47.	The internal energy of (1) Temperature and (3) Entropy and pres		(2)	of : Volume and pres Temperature only			
48.	The Rateau turbine be (1) Pressure compout (3) Velocity compout		(2)	Reaction turbine Radial flow turbi	ne		
49.		uid element rotates lik dius of the Mohr's circ (2) 0 unit	le, cl		tate	,	
50.	(2) Rate of Shear str(3) Shear stress is pr	d: oportional to shear straces is proportional to soportional to rate of shees is proportional to ra	shear near	strain			
МРН/І	PHD/URS-EE-2019/(!	Mech. Engg.)-(SET-Z)/(A	1 4			

51.		ors tool life equation f new tool life to ori			e cutt	ing speed is reduc	ed by
	(1) 4	(2) 2	(3)	1	(4)	0.5	
52.	Interpolator in	a CNC machine:					
. 22	(1) Controls sp	oindle speed	(2)	Coordinates axe	s mov	vements	
	(3) Operates to	ool changer	(4)	Commands can	red cy	/cle	
53.	The non-tradition	onal machining proc	ess that esser	ntially requires va	cuum	is:	
	(1) Electron be			Electro chemica			
	(3) Electro cher	mical discharge machi	ning (4)	Electro discharg	e mad	chining	
54.	method of riser as cooling surfa [in mm] is:	b with diameter of design. Assume that design desig	t the bottom of the riser is	surface of cylind equal to its heigl	rical i	riser does not cont en the height of the	ribute
	(1) 150	(2) 200	(3)	100	(4)	125	
55.	(i) Diffusion v	nert gas welding	(ii) (iv)	e autogencous is ' Electroslag weld Friction welding (ii) and (iv)	ling	(i) and (iii)	
56.	In fill mould (ca	avity-less) casting pr	cocess, the pa	ttern is made of:			
	(1) Expanded p	oolystyrene	(2)	Wax			
	(3) Epoxy		(4)	Plaster of Paris			
57.	cutting speed of	tutting tool with 0° ref 180 m/min. the three p is 0.7, then the pover (2) 2.1	ust force is 4 wer consump	90 N. If the coeff	ficient he ma	t of friction betwe	en the
EO	•	phere made or cast	` ,				ntical
58.		time taken for solid					
	(1) 6.57355 sec	c. (2) 7.23455	sec. (3)	5.23455 sec.	(4)	2.52355 sec.	
59.	respectively, whe carried out at a	welding process, to the welding speed welding speed of 1 weld quality remain (2) 44.72	d was 150 m 20 mm/min s the same th	m/min. In another at the same are	er pro voltag t (in A	cess, the TIG weld ge and heat input	ding is to the
MPH/P	HD/URS-EE-20	19/(Mech. Engg.)-(SET-Z)/(A)	10		are management	. T. O

60.	The fluidity of molt increase in:	en metal of cast alle	oys (without any ac	ddition of fluxes) increases with
	(1) Freezing range		(2) Surface tens	ion
	(3) Degree of superly	icat	(4) Viscosity	
61.	The most common lin	mit gage used for insp	pecting the hole diar	neter is:
	(1) Ring gage		(2) Snap gage	
	(3) Plug gage		(4) Master gage	
62.	of 20 V at a welding input per unit length of	speed of 5 mm/s. A ofthe weld will be (k.)	ssuming that the ard //mm -round off to o	
	(1) 0.7	(2) 0.9	(3) 0.4	(4) 0:3
63.	Hardenability of steel			
	(1) The ability to har			
				itized and then quenched
,	(3) The ability to reta(4) The depth to when quenched			nen it is austenitized and then
64.			_	gainst a work piece (when there luce a roughened surface with a
	(1) Strip rolling	(2) Knurling	(3) Roll forming	(4) Chamfering
65.	The preferred option f	or holding an odd-sh	aped workpiece in a	centre lathe is:
	(1) Live and dead cer	itres	(2) Three jaw chu	ick
	(3) Lathe dog		(4) Four jaw chuc	:k
66.	sectional area of the w	/eld bead is 20 mm². f melting is 14 J/mn	The work-piece and n ³ . Assuming a then	and current = 100 A. The cross- filler are of titanium for which rmal efficiency of the welding cimal places):
	(1) 7.5	(2) 8.5	(3) 9.5	(4) 5.5
67.	Feed rate in slab milling	g operation is equal	to:	
	(1) Rotation per minu		1, 9.4	
	(2) Product of rpm an(3) Product of rpm, fe	d number of teeth in		attor
	(4) Product of rpm, fe			
МРН/Р	HD/URS-EE-2019/(M			ru 24 de e discontaño

68.	During solidification of a pure molten metal (1) Coarse and randomly oriented (3) Fine and ordered	, the grains in the casting near the mould wall are: (2) Fine and randomly oriented (4) Coarse and ordered
69.	Metal removal in electric discharge machine (1) Ion displacement (3) Corrosive reaction	ng takes place through: (2) Melting and vaporization (4) Plastic shear
70.	In a wire-cut EDM process the necessar successful cut are that: (1) Wire and sample are electrically non-cot(2) Wire and sample are electrically conducting and sample (4) Sample is electrically conducting and vertex.	eting ple is electrically non-conducting
71.	Internal gears are manufactured by: (1) Hobbing (3) Shaping with rack cutter	(2) Shaping with pinion cutter(4) Milling
72.	For an orthogonal cutting operation, tool not 0.8 mm, speed is 48 m/min and feed is 0.4 roughly 19.24 (2) 29.70	aterial is HSS, rake angle is 22° chip thickness is nm/rev. The shear lane angle (in degrees] is: (3) 56.00 (4) 68.75
73.	Chaplets are placed between mould and core (1) Reduce directional solidification (3) Help easy removal of core from casting	e surfaces in order: (2) Help local alloying of molten metal (4) Prevent core movement due to buoyancy
74.	An expandable pattern is used in: (1) Slush casting (3) Centrifugal casting	(2) Squeeze casting(4) Investment casting
75.	In the manufacture of the twist drills, the sh(1) Spot Welding(3) Projection Welding	ank is joined to the body of the drill using: (2) TIG Welding (4) Friction Welding
76.	supplied in units of 1 kg costing Rs. 25 e	nanufacturing company is 2000 kg. The rivets are ach. If it costs Rs. 100 to place an order and the ts purchase cost, the cycle length of the order (in
	(1) 73 (2) 77	(3) 80 (4) 85
MPII/P	PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)	/(A) P. T. O

. 7		nufacturer has cost per month			rdin	g a product:				
		ble cost per uni								
		g price Per unit								
		ction capacity								
		-		-		-4-4	41		nofit (in	Da \
	1S:				ne r	ated capacity, th	en in	ie montniy p	ront (m	Ks.)
	(1) 60	0,000	(2) 70,0	000	(3)	57,000	(4	72,000		
78		examination of	ent of a p	oroduct, an en y and tolerar	ntire	ly new process jinformation. Thi	plan s typ	is made base e of process	ed on de plannir	esign ng is
	(1) Re	etrieval			(2)	Generative				
	(3) Va	riant			, ,	Group technolog	gy ba	ised		
79	Annual	demand of a	muadicat	:- 50000					_	
, ,	Consid	ering the basic	economi	c order quant	titv	nd the ordering model, the econo ted, the annual in	amic	order quant	ity is 10	nnn
	(1) 35,	000	(2) 43,33	30	(3)	45,000	(4)	65,000		
80.	and get	lity that the stu	o marks i	n it is 5%. G above 90% m	il V F		pas	tudent passir ses the exam	g the eximation,	the
81.	Rs. 400	per order. If the	e current	uing cost is F order quanti	⟨S. ∠ tv' i	ny is 10,000 unit 24 per valve per s changed to Eco will be (Rs. rou	year	and the orde	ring cos	st is
	(1) 943.	59 (2) 948.59	9 (3) 9	940.59	(4)	941.59		
82.	defective	ability that a pselected rando is (round off to	mily and	msbeeten. m	en t	ompany will be on the probability the	defec	tive is 0.05. least two pa	If 15 starts will	uch be
	(1) 0.19	(2	2) 0.17	(2	3) (0.14	(4)	0.13		
83.	If x is the	mean of data 3	3, x, 2 and	4, then the r	nod	e is :				
	(1) 4) 2		3		(4)	0		
	quantity o	re distributor of arrying cost in f the tyres is:	Rs. 16	sell approxi	imat orc	ely 9600 steel b lering cost is R			next yo	ear. der
	(1) 64		212	(3) 3	00	(4)	1200		
MPH/P	HD/URS-1	EE-2019/(Mee	h. Engg.)	-(SET_2)// A	,		(4)	1200		
			('ממ	(SE 1-2)/(A	()		(

A	
85.	The time series forecasting method that gives equal weightage to each of the M most recent observation is :
	(1) Moving average method
	(2) Exponential smoothing with linear trend
	(3) Triple Exponential smoothing
	(4) Kalman Filter
86.	Four red balls, four green balls and four blue balls are put in a box. Three balls are pulled out of the box at random one after another without replacement. The probability that all the three balls are red is:
	(1) 1/72 (2) 1/55 (3) 1/36 (4) 1/27
87.	At a work station, 05 jobs arrive every minute. The mean time spent on each job in the work station is 1/8 minute. The mean steady state number of jobs in the system is:
	(1) 1.666 (2) 1.888 (3) 1.777 (4) 1.999
88.	The jobs arrive at a facility for a service, in a random manner. The probability distribution of number of arrivals of jobs in a fixed time interval is:
	(1) Normal (2) Poisson (3) Erlang (4) Beta
89.	Little's law is a relationship between:
00.	(1) Stock level and lead time in an inventory system
	(2) Waiting time and length of queue in a queuing system
	(3) Number of machines and job due dates in a scheduling problem
	(4) Uncertainty in the activity time and project completion time
90	For a single server with passion arrival and exponential service time, the arrival rate is 12 per hour. Which one of the following service rates will provide a steady state finite queue length?
	(1) 06 per hour (2) 10 per hour (3) 12 per hour (4) 24 per hour
91	In a single channel queuing model, the customer arrival rate is 12 per hour and the serving rate is 24 hour per. The expected time that a customer is in queue is (min):
	(1) 2.5 (2) 3.5 (3) 1.5 (4) 4.5
92	. The word Kanban is most appropriately associated with:
	(1) Economic order quantity (2) Just in time production
	(3) Capacity planning (4) Product Design
93	3. A company uses 2555 units of an item annually. Delivery lead time is 08 days. The recorder point (in number of units) to achieve optimum inventory is:
	(1) 07 (2) 08 (3) 56 (4) 60
MPI	I/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(A)

94	4. The supply at three sources is 50, 40 & destination is 20, 30, 10 & 50 units. In solving	60 units respectively while the demand at four						
		(1) A dummy source of capacity 40 units is needed						
	(2) A dummy destination of capacity 40 units is needed							
	(3) No solution exists as the problem is infeasible							
	(4) No solution exists as the problem is deg							
95.		on taken during the aggregate production planning						
	(1) Scheduling of Machines							
	(2) Amount of labour to be committed							
	(3) Rate at which production should happen	ı						
	(4) Inventory to be carried forward							
96.	. Production flow analysis (PFA) is a method of	of identifying part families that uses data from:						
	(1) Engineering Drawing	(2) Production schedule						
	(3) Bill of Materials	(4) Route Sheet						
97.	Which of the following forecasting methods the next period forecast?	takes a fraction of forecast error into account for						
	(1) Simple average Method	(2) Moving average method						
	(3) Weighted Moving average method	(4) Exponential smoothing method						
98.	The time series forecasting method that give observations is:	es equal weightage to each of the m most recent						
	(1) Moving average method	(2) Exponential smoothing with linear trend						
	(3) Triple Exponential smoothing	(4) Kalman Filter						
99.	Production times for P and Q are 5 hours and	fits of Rs. 100 and Rs. 80 per piece, respectively. If 3 hours, respectively, while the total production the size of 40, to maximize profit, the number of						
	(1) 12 (2) 15 (3) 18 (4) 20						
100.	Rs. 40,000,8 carn Rs. 60,000, and 2 carn Rs. 1	s. 20,000 per month, 25 earn Rs. 30,000, 20 earn 150,000. The median of the salaries is :						
	and the second of the second o	3) Rs. 32,300 (4) Rs. 40,000						
MPH/P	PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(A)						

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU

ARE ASKED TO DO SO)

SET-Z

10026

Total No. of Printed Pages: 13

M.Phil./Ph.D./URS-EE-2019

SUBJECT: Mechanical Engineering

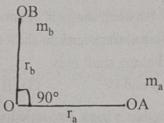
		Sr. No
Time : 11/4 Hours	Max. Marks: 100	Total Questions: 100
Roll No. (in figures)	(in words)	
Name	Father's Name	
Mother's Name	Date of Examination	
(Signature of the Candidate)	_	(Signature of the Invigilator)

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 unfairmeans / 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 will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E.Mail within 24 hours of uploading the same on the University Website. 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 will be no negative marking. 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.

MPH/PHD/URS-EE-2019/(Mech. Engg.)(SET-Z)/(B)

- 1. Two masses A and B having mass m_a and m_b , respectively, lying in the plane of the figure shown, are rigidly attached to a shaft which revolves about an axis through O perpendicular to the figure. The radii of rotation of the masses m_a and m_b are r_a and r_b respectively. The angle between lines OA and OB is 90°. If $m_a = 10$ kg, $m_b = 20$ kg, $r_a = 200$ mm and $r_b = 400$ mm, then the balance mass to be placed at a radius of 200 mm is (kg --- round off to two decimal places):
 - (1) 41.23
- (2) 42.23
- (3) 40.23
- (4) 43.23



- 2. The thickness of a sheet is reduced by rolling (without any change in width) using 600 mm diameter rolls. Neglect elastic deflection of the rolls and assume that the coefficient of friction at the roll-work piece interface is 0.05. The sheet enters the rotating rolls unaided. If the initial sheet thickness is 2 mm, the minimum possible final thickness that can be produced by this process in a single pass is (mm -- round off to two decimal places):
 - (1) 1.35
- (2) 1.25
- (3) 1.45
- (4) 1.15
- 3. Consider a linear rectangular thin sheet of metal, subjected to uniform uniaxial tensile stress of 100 MPa along the length direction. Assume plane stress conditions in the plane normal to the thickness. The Young's modulus E = 200 MPa and Poisson's ratio v = 0.3 are given. The principal strains in the plane of the sheet are:
 - (1) (0.5, 0.0)
- (2) (0.35, -0.15)
- (3) (0.5, -0.5)
- (4) (0.5, -0.15)
- **4.** Sphere 1 with a diameter of 0.1 m is completely enclosed by another sphere 2 of diameter 0.4 m. The view factor F_{12} is:
 - (1) 0.25
- (2) 0.0625
- (3) 1.0
- (4) 0.5
- 5. The state of stress at a point in a component is represented by a Mohr's circle of radius 100 MPa centered at 200 MPa on the normal stress axis. On a plane passing through the same point, the normal stress is 260 MPa. The magnitude of the shear stress on the same plane at the same point is (MPa):
 - (1) 80
- (2) 90
- (3) 60
- (4) 70
- 6. Endurance limit of a beam subjected to pure bending decreases with:
 - (1) Increase in the surface roughness and increase in the size of the beam
 - (2) Decrease in the surface roughness and decrease in the size of the beam
 - (3) Decrease in the surface roughness and increase in the size of the beam
 - (4) Increase in the surface roughness and decrease in the size of the beam
- 7. Which of the following is the most conservative fatigue failure criterion?
 - (1) Soderberg

(2) Modified Goodman

(3) ASME Elliptic

(4) Gerber

MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(B)

P. T. O.

8. Pre-tensioning of	a bolted joint is used to		
	ness of the bolted joint	(4) Prevent yield	fness of the bolted joint ling of the thread root
I. Torsional loaII. A velocity raIII. Bending load	oupling used between to d is transferred along slatio of 1:2 between shaft is transferred transvers ansferred along shaft ax (2) I and IV	wo shafts, which amonaft axis. s is obtained without	ong the following statements are
(1) Below 0.5 11. In a single channe	(2) 0.5 to 0.8	ynamic load rating (c ₁ g is 45 kN, the expect (3) 0.8 to 1.0	
(1) 2.5	(2) 3.5	(3) 1.5	(min): (4) 4.5
12. The word Kanban (1) Economic ord (3) Capacity plans	er quantity ning	(2) Just in time pr(4) Product Design	n
13. A company uses 2 point (in number of (1) 07	555 units of an item are funits) to achieve option (2) 08	mually Delivery 1	d time is 08 days. The recorder
(1) A dummy sour(2) A dummy desti(3) No solution exi	ce sources is 50, 40 and 50, 10 & 50 units. In solution of capacity 40 units and the state of the problem is in the state of the problem is desired as the problem is desired.	& 60 units respectivelying this transportation is needed units is needed feasible	(4) 60 ely while the demand at four on problem:
			aggregate production planning
	ur to be committed roduction should happe	en e	
NADYL MYSS	Mach Engal (CEM of		

16.	Production flow analysis (PFA) is a method of	of id	entifying part families that uses data from:
			Production schedule
		(4)	Route Sheet
17.	Which of the following forecasting methods the next period forecast?	tak	es a fraction of forecast error into account for
	(1) Simple average Method	(2)	Moving average method
	(3) Weighted Moving average method	(4)	Exponential smoothing method
18.	The time series forecasting method that give observations is:	es e	equal weightage to each of the m most recent
	(1) Moving average method(3) Triple Exponential smoothing	(2) (4)	Exponential smoothing with linear trend Kalman Filter
19.	Production times for P and Q are 5 hours are time available is 150 hours. For a total bar units of P to be produced is:	nd 3 tch	of Rs. 100 and Rs. 80 per piece, respectively. hours, respectively, while the total production size of 40, to maximize profit, the number of
20.	Rs. 40,000,8 earn Rs. 60,000, and 2 earn Rs	RS.	20,000 per month, 25 earn Rs. 30,000, 20 earn 0,000. The median of the salaries is:
	(1) Rs. 20,000 (2) Rs.30,000		Rs. 32,300 (4) Rs. 40,000
21	. Internal gears are manufactured by: (1) Hobbing (3) Shaping with rack cutter	(2)	Shaping with pinion cutter Milling
22	2. For an orthogonal cutting operation, tool of 0.8 mm, speed is 48 m/min and feed is 0.4 mm. (1) 19.24 (2) 29.70	mm/	rial is HSS, rake angle is 22° chip thickness is rev. The shear lane angle (in degrees] is: (4) 68.75
23	Chaplets are placed between mould and con(1) Reduce directional solidification(3) Help easy removal of core from casting	(2	refaces in order: Help local alloying of molten metal Prevent core movement due to buoyancy
24	4. An expandable pattern is used in:		
	(1) Slush casting	(2	
	(3) Centrifugal casting	(4) Investment casting

	25. In the manufacture of (1) Spot Welding	the twist drills, the		s joined to the TIG Welding	body of the	drill using:
	(3) Projection Weldi	ng	(4)	Friction Weld	ing	
	26. The annual requirement supplied in units of 1 annual cost of carrying days) will be:	kg costing Rs. 25	each.	If it costs Rs.	100 to place	e an order and the
	(1) 73	(2) 77	(3)	80	(4) 85	
2	Fixed cost per month = Variable cost per unit = Selling price Per unit = Production capacity = If the production is car is:	= Rs. 50000 = Rs. 200 = Rs. 300 1500 units per mont	h		en the mon	thly profit (in Rs.)
	(4)	2) 70,000		57,000	(4) 72,00	
28	logic, examination of g known as: (1) Retrieval (3) Variant	and tolora	entirely nee inf (2) G (4) G	new process promation. This denerative	plan is mad type of pr	e based on design rocess planning is
	Considering the basic equality When the annual is is:	conomic order quan	nits and ntity mo nimized	the ordering odel, the econo l, the annual in	cost is Rs. mic order ventory hol	7000 per order. quantity is 10000 ding cost (in Rs.)
) 43,330	(3) 45		(4) 65,00	0
30.	The chance of a student and getting above 90% probability that the stude (1) 1/18 (2)	nt gets above 90% n	5 20%. GIVEN narks is (3) 2/9	mai a student	passes the	passing the exam examination, the
31.	Using the Taylors tool line 50% the ratio of new tool	fe equation with ex	nonent	n = 0.5 :54	(4) 5/18 cutting spe	eed is reduced by
	(1) 4 (2)	•	(3) 1		(4) 0.5	
32.	Interpolator in a CNC made					
	(1) Controls spindle spee	PATRICIA DE LA CONTRACTOR DEL CONTRACTOR DE LA CONTRACTOR DE LA CONTRACTOR DE LA CONTRACTOR	(2) Co	ordinates axes	movements	sand and a
ADII/D	(3) Operates tool changer		4) Co	mmands canne	d cycle	
H 11/P	HD/URS-EE-2019/(Mech	. Engg.)-(SET-Z)/(B)	direction and		

33.	The non-traditional machining process that	esser	ntially requires vac	uum is :
	(1) Electron beam machining	(2)	Electro chemical	machining
	(3) Electro chemical discharge machining	(4)	Electro discharge	machining
34.	A cylindrical job with diameter of 200 mm method of riser design. Assume that the boas cooling surface. If the diameter of the rise [in mm] is: (1) 150 (2) 200	ttom ser is	surface of cylindri	ical riser does not contribute
35.	Which two of the following joining process	05 01	e autoganaous is ?	
	(i) Diffusion welding		Electroslag weldi	
	(iii) Tungsten inert gas welding) Friction welding	6
	(1) (i) and (iv) (2) (ii) and (iii)		(ii) and (iv)	(4) (i) and (iii)
36.	In fill mould (cavity-less) casting process,			
	(1) Expanded polystyrene		Wax	
	(3) Epoxy		Plaster of Paris	
37.	A single point cutting tool with 0° rake and cutting speed of 180 m/min. the thrust force tool and the chip is 0.7, then the power control of the chip is 0.7.	e is	490 N. If the coeff	icient of friction between the
	(1) 3.5 (2) 2.1	(3)	5.6	(4) 7.1
38.	A cube and a sphere made or cast iron (e conditions. The time taken for solidifying the sphere is:			
	(1) 6.57355 sec. (2) 7.23455 sec.	(3) 5.23455 sec.	(4) 2.52355 sec.
39	During a TIG welding process, the arc respectively, when the welding speed was carried out at a welding speed of 120 mr material so that weld quality remains the s (1) 40.00 (2) 44.72	150 n/mi ame	mm/min. In anothern at the same arc with the welding current	r process, the TIG welding is voltage and heat input to the t (in A) for this process is:
) 55.90	(4) 62.25
40	The fluidity of molten metal of cast allouincrease in:	oys (without any additi	on of fluxes) increases with
	(1) Freezing range	(2) Surface tension	
	(3) Degree of superheat	(4) Viscosity	
MPI	I/PHD/URS-EE-2019/(Mech. Engg.)-(SET-	Z)/(I	3) * 11. 11. 11. 11. 11. 11. 11. 11. 11. 1	P.T.O

6	
	41. An air standard Otto cycle has thermal efficiency of 0.5 and the mean effective pressure of the cycle is 1000 kPa. For air, assume specific heat ratio y = 1.4 and specific gas constant R = 0.287 kJ/kg.K, If the pressure and temperature at the beginning of the compression stroke are 100 kPa and 300 K, respectively, then the specific net work output of the cycle is (kJ/kg round off to two decimal places):
	(1) 608.6 (2) 908.6 (3) 708.8 (4) 1008.8
4	An idealized centrifugal pump (blade outer radius of 50 mm) consumes 2 kW power while running at 3000 rpm. The entry of the liquid into the pump is axial and exit from the pump is radial with respect to impeller. If the losses are neglected, then the mass flow rate of the liquid through the pump is (kg/s round off to two decimal places):
	(1) 8.106 (2) 7.106 (3) 6.106 (4) 9.106
43	diameter 10 mm, at a feed of 0.25 mm/rev and a spindle speed of 1200 rpm. If the specific energy required for cutting this material is 0.7 N.m/mm ³ , the power required for drilling is (W round off to two decimal places):
	(1) 211.0)
44	One-dimensional steady state heat conduction takes place through a solid whose cross- sectional area varies linearly in the direction of heat transfer. Assume there is no heat generation in the solid and the thermal conductivity of the material is constant and independent of temperature.
	The temperature distribution in the solid is:
	(1) Ouadratic (2) Exponential (3) Logarithmic (4) Linear
5.	Which one of the following modifications of the simple ideal Rankine cycle increases the thermal efficiency and reduces the moisture content of the steam at the turbine outlet: (1) Decreasing the condenser pressure. (2) Increasing the boiler pressure. (3) Decreasing the boiler pressure. (4) Increasing the turbine inlet temperature.
5.	Water enters a circular pipe of length $L=5.0$ m and diameter $D=0.20$ m with Reynolds number $R_{eD}=500$. The velocity profile at the inlet of the pipe is uniform while it is parabolic at the exit. The Reynolds number at the exit of the pipe is:
	(1) 450 (2) 550 (3) 500 (4) 600
	Ambient air is at a pressure of 100 kPa, dry bulb temperature of 30°C and 60% relative humidity. The saturation pressure of water at 30°C is 4.24 kPa. The specific humidity of air (in g/kg of dry air) is (correct to two decimal places):
	(1) 16.24 (2) 17.24 (3) 18.24 (4) 15.24

MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(B)

(4) 15.24

48.	The peak wavel um. If the peak K) of the black	wavelength	liation emitted of emitted radi	by a blation of	ack body at a changes to 2.90	temper 0 um, t	ature of 200 hen the tem	0 K is 1.45 perature (in
	(1) 500	(2) 1	000	(2)	4000	(4)	8000	
49.	(4) The absolu	lade is symrolade is sym te inlet flow te exit flow	metric. metric. angle is equal to	to abso	lute exit flow a	angle.		
50.	(3) Its volume	e is less than ture is less t is less than	than the saturation of the volume of the enthalpy of the	on tem	e at a given ter perature at a gi rated vapour at	nperatuiven pro	essure.	e.
51.	acceleration di	ne to gravit	ally up from grovelocity after e y is 10 m/s ² and another est on the	ach co	ollision with the air resistance after a total	ne grou	and. Assuming ligible, the n seconds) of	ng that the
52.	(1) Increases (2) Decreases	linearly with linearly wit ases linearly	stic material. The the true strain the true strain and then decre				avl and a	
53	. The spring con	nstant of a he	elical compressi	on spri	ng DOES NOT	depen	d on ·	
	(1) Coil diam (3) Number of	eter		(2)	Material streng Wire diameter	gth		
54	memod of fist	ducsign. A:	meter of 200 missume that the b	ottom	surface of culir	dringl.	minou J.	
	(1) 150	(2)	200	(3)	100	(4)	125	
55		beam having 19%, the tip	g square cross-s deflection decre	ection ases ap	of side a is supproximately by	hiected		oad. If a is
New	(1) 19%	(2)	29%	(3)	41%		50%	
MP	H/PHD/URS-EE	2019/(Mech	n. Engg.)-(SET-	Z)/(B)				P. T. O.

M

	56.	through	the wall	is 1000	Wand the	surroun	ding	temperat	ure 18 23	5°C.	Assum.	te of heat ling no ge the wall is	ncrano
		(1) 27			248			360		(4)	244		
5		Air in a The satt of dry a	uration pr	at 35°C a	nd 60% re water at 3	elative h	umic 5.63	lity (RH) kPa. The	The pre humidit	essur ty ra	e in the	room is the air (in	0.1 MP grain/k
		(1) 21.	74	(2)	22.20		(3)	25.17		(4)	20.37	,	
5	(Hol Hol Hol 	ds becaus ds becaus ds becaus	se the flow se the flow se the flow	or a steady w is steady w is incom v is transit the flow	y npressibl tional	e	ble flow,	the Ber	noul	li equa	tion:	
59	(i (i (i (1	i) increi) reduii) drierj) Only	ease in avection in the steam at (i) and (ii)	wing state erage ten hermal ef the turbin ii) are con ii) are con	ne exit	of heat a	dditi	on Only (ii) an	and (iii)	are o	correct		
60.	se	ower of	10 KW W	amometer hen the symmeter (2) 5	is:	tation of	cranif the	shaft is 4	100 rad/s	C. ens. Th	e shaft	neasures a torque (i	a brake n N-m
61.			of the fo		is NOT a					(4)	43		
					ear pump			et pump		(1)	17		
62.											Vane p		
OZ.	Ca	ilu exis	is at 50 e	. The val	ue of the f	Log Mea	an Te	emperatu	re Diffe	renc	e (LM	s the tube TD) is (°(e at 20°C).
		55.76		(2) 58				3.82			69.33		
	velo	ocity of uracy) o	the slid	t tile illist	/s, the m	HERIOSEE OF BEEN		no rod 1	O 30 0 1000 0	400 Principal	The Residence of the Party of t	rod are 3 the crank decimal	
		0.222		(2) 0.2) 0.		((4)	0.316		
	of th	e blank			cup with e sheet th				n is dra r (upto 2	awn 2 de	from cimal p	.circular	blank.
	(1)	27.12		(2) 28.	72	(3)	29	49	(4)	33.41		
PHÆ	ID/U	JRS-EF	E-2019/(N	Mech. Er	gg.)-(SE	T-Z)/(B)		harp.				

65.	Air contains 79% N ₂ and 21% O ₂ on a mair than required stoichiometrically. As percentage of N ₂ in the products is:	nolar ba	sis. Methane complete complete	(CH ₄) is burned with mbustion of methan	h50% excess e, the molar
	(1) 70 (2) 73.8	(2)	75	(4) 79.8	
66.	Heat and Work are:				
	(1) Intensive properties	(2)	Extensive pr	operties	
	(3) Point functions		Path function		
67.	The internal energy of an ideal gas is a f				
	(1) Temperature and pressure		Volume and	pressure	
	(3) Entropy and pressure	(4)	Temperature		
68.	The Rateau turbine belong to the categor		remperature	Oilly	
	(1) Pressure compounded turbine		Donation tum	.	
	(3) Velocity compounded turbine		Reaction tur Radial flow		
69.					
00.	A two dimentional fluid element rotates pressure is 1 unit. Radius of the Mohr's	s like a i	rigid body. A	a point with in the	element, the
	(1) 0.5 unit (2) 0 unit		01 unit	(4) 2 units	ne point is:
70.	For a Newtonian fluid:			(1) 2 411165	
	(1) Shear stress is proportional to shear	strain			
	(2) Rate of Shear stress is proportional		strain		
	(3) Shear stress is proportional to rate of				
	(4) Rate of shear stress is proportional				
71.	The most common limit gage used for in	nspectin	g the hole dia	neter is:	
	(1) Ring gage		Snap gage		
	(3) Plug gage	(4)	Master gage		
72	A gas tungsten arc welding operation is of 20 V at a welding speed of 5 mm/s input per unit length of the weld will be (1) 0.7 (2) 0.9	Assumi (kJ/mm	ing that the ar	c efficiency is 70%,	
73	Hardenability of steel is a measure of:				
	(1) The ability to harden when it is col	d worke	d		
	(2) The maximum hardness that can be o			nitized and then quenc	hed
	(3) The ability to retain its hardness wl				
	(4) The depth to which required has quenched				ed and then
MPI	H/PHD/URS-EE-2019/(Mech. Engg.)-(SE	T-Z)/(B)	Marie Street Commence	P. T. O.

10
 74. The cold forming process in which a hardened tool is pressed against a work piece (when there is relative motion between the tool and the work piece) to produce a roughened surface with a regular pattern is: (1) Strip rolling (2) Knurling (3) Roll forming (4) Chamfering
75. The preferred option for holding an odd-shaped workpiece in a centre lathe is: (1) Live and dead centres (2) Three jaw chuck (3) Lathe dog (4) Four jaw chuck
 76. A welding operation is being performed with voltage = 30 V and current = 100 A. The cross-sectional area of the weld bead is 20 mm². The work-piece and filler are of titanium for which the specific energy of melting is 14 J/mm³. Assuming a thermal efficiency of the welding process 70%, the welding speed is (in mm/s correct to two decimal places): (1) 7.5 (2) 8.5 (3) 9.5 (4) 5.5
 77. Feed rate in slab milling operation is equal to: Rotation per minute (rpm) Product of rpm and number of teeth in the cutter Product of rpm, feed per tooth and number of teeth in the cutter (4) Product of rpm, feed per tooth and number of teeth in contact
78. During solidification of a pure molten metal, the grains in the casting near the mould wall are: (1) Coarse and randomly oriented (2) Fine and randomly oriented (3) Fine and ordered (4) Coarse and ordered
79. Metal removal in electric discharge machining takes place through: (1) Ion displacement (2) Melting and vaporization (3) Corrosive reaction (4) Plastic shear
80. In a wire-cut EDM process the necessary conditions that have to be met for making a successful cut are that: (1) Wire and sample are electrically non-conducting (2) Wire and sample are electrically conducting (3) Wire is electrically conducting and sample is electrically non-conducting (4) Sample is electrically conducting and wire is electrically non-conducting
81. A cylindrical tank with closed ends is filled with compressed air at a pressure of 500 kPa. The inner radius of the tank is 2 m. and it has wall thickness of 10 mm. The magnitude of maximum in-plane shear stress (in MPa) is: (1) 22 (2) 24 (3) 25 (4) 29
82. In a machining operation, if the generatrix and directrix both are straight lines, the surface obtained is: (1) Cylindrical (2) Helical (3) Plane (4) Surface of revolution
MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(B)

83.	A single-degree-freedom spring-mass system is subjected to a sinusoidal force of 10 N
	amplitude and frequency w along the axis of the spring. The stiffness of the spring is 150 N/m, damping factor is 0.2 and the undamped natural frequency is 10w. At steady state, the
	amplitude of vibration (in m) is approximately:

(1) 0.05

(2) 0.07

(3) 0.70

(4) 0.90

A hollow shaft of 1 m length is designed to transmit a power of 30 kW at 700 rpm. The maximum permissible angle of twist in the shaft is 1°. The inner diameter of the shaft is 0.7 times the outer diameter. The modulus of rigidity is 80 GPa. The outside diameter (in mm) of the shaft is:

(1) 44.5212 mm

(2) 54.5212 mm

(3) 64.5212 mm

(4) 48.5212 mm

The atomic packing factor for a material with body centered cubic structure is:

(1) 0.68

(2) 0.53

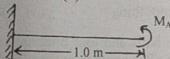
(3) 0.89

A horizontal cantilever beam of circular cross-section, length 10 m and flexural rigidity El = 200 N.m² is subjected to an applied moment $M_A = 1.0$ N-m at the free end as shown in the figure. The magnitude of the vertical deflection of the free end is (mm --- round off to one decimal place):

(1) 2.5

(2) 1.5

(4) 0.5



87. A wire of circular cross-section of diameter 1.0 mm is bent into a circular arc of radius 1.0 mm by application of pure bending moments at its ends. The Young's modulus of the material of the wire is 100 GPa. The maximum tensile stress developed in the wire is (MPa):

(1) 60

(2) 70

(3) 50

A small ball of mass 1 kg moving with a velocity of 12 m/s undergoes a direct central impact with a stationary ball of mass 2 kg. The impact is perfectly elastic. The speed (in m/s) of 2 kg mass ball after the impact will be:

(1) 4

(2) 8

(3) 6

(4) 2

89. A gas is stored in a cylindrical tank of inner radius 7 in and wall thickness 50 mm. The gage pressure of the gas is 2 MPa. The maximum shear stress (in MPa) in the wall is:

(1) 35

(2) 70

(3) 140

90. In a spring-mass system, the mass is m and the spring constant is k. The critical damping coefficient of the system is 0.1 kg/so In another spring-mass system, the mass is 2m and the spring constant is 8k. The critical damping coefficient (in kg/s) of this system is:

(1) 0.6

(2) 0.3

(3) 0.4

(4) 0.8

MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(B)

10

91.	Rs. 400 per ord	er order. The holding ler. If the current orde	cost is Rs. 24 per va r quantity' is change ory per year will be (000 units. The current order live per year and the order d to Economic Order Quar (Rs. round off value to two (4) 941.59	ng cost is
00			(=) - 10103		0.15
92.	defective is (roun	d randomly and inspend off to two decimal j	cted, then the probab	vill be defective is 0.05. If bility that at least two part	s will be
	(1) 0.19	(2) 0.17	(3) 0.14	(4) 0.13	
93.	If x is the mean of	of data 3, x, 2 and 4, th	en the mode is:		
	(1) 4	(2) 2	(3) 3	(4) 0	
94.	A local tyre distr	ibutor expects to sell	annrovimataly 0600		
	quantity of the tyr	es is :	re and ordering co	steel belted radial tyres no st is Rs. 75. The econom	ext year. ic order
	(1) 64	(2) 212	(3) 300	(4) 1200	
95.	The time series for baservation is:	precasting method that		age to each of the M mos	t recent
(.	 Moving avera Triple Expone 	ntial smoothing	(4) Kalman Fili	I smoothing with linear trea	
96. F	our red balls, four f the box at rando alls are red is:	r green balls and four om one after another v	11 1 11	a box. Three balls are pul The probability that all th	led out
(1) 1/72	(2) 1/55	(3) 1/36	(1) 1/07	
(1)	1.066	(2) 1.888	(3) 1 777	ne spent on each job in the the system is:	
98. The	jobs arrive at a	facility for a service	(-),	(4) 1.999	
nur (1)	nber of arrivals of Normal	f jobs in a fixed time i (2) Poisson		(4) 1.999 The probability distribut	tion of
			(3) Erlang	(4) Beta	
(1)	le's law is a relation	onship between:			
(2)	Waitha ti	ead time in an invento	ory system		
	treating time and	length of quare !-			
The second secon	THE RESERVE OF THE PARTY OF THE	HIES ADD TOP AND THE		blem	
). For a	Which server wi	th passion arrival and	evponential		
(1) (% ner have	e following service ra	tes will provide	e time, the arrival rate is 1 eady state finite queue length.	2 ner
(/DITT	o her nour	(2) 10 per hour	(3) 12 per hour	eady state finite queue len	gth?
VA. 60 10 10 7/1 8	RS.FF 2010		- Per Hour	(4) 21 1	

(3) 12 per hour

MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(B)

(4) 24 per hour

Total No. of Printed Pages: 13

SET-Z

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

C

M.Phil./Ph.D./URS-EE-2019

SUBJECT: Mechanical Engineering

	•	Sr. No10027
Time : 11/4 Hours	Max. Marks : 100	Total Questions : 100
Roll No. (in figures)	(in words)	·
Name	Father's Name	
Mother's Name	Date of Examination_	
		(Cinneture of the Invigilator)
(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 unfairmeans / 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 will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E.Mail within 24 hours of uploading the same on the University Website. 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 will be no negative marking. 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.

MPH/PHD/URS-EE-2019/(Mech. Engg.)(SET-Z)/(C)

1.	Which one of the foll (1) Centrifugal pump		.ing m (3)	Jet pump	(4)	Vane pump
2.	Saturated steam at 10 C and exists at 50°c.	And anniance on the	Mear	side of a tube. Co Temperature Dil 63.82	icicii	id enters the tube at 20° ce (LMTD) is (°C). 69.33
3.	For an inline slider-cr	rank mechanism, the the instant when the r is lm/s, the magr	conn	ecting roa is pert	city	nnecting rod are 3m and cular to the crank, if the (upto 3 decimal points
	(1) 0.222	(2) 0.267	, ,	0.298	` '	0.316
4.	A 10 mm deep cyl Neglecting the variati of the blank is (mm):	on in the sheet thick	iamet ness,	er of 15mm is the diameter (upt	drawi .o 2 d	n from .circular blank. ecimal points accuracy)
	(1) 27.12	(2) 28.72	(3)	29.49	(4)	33.41
5.	Air contains 79% N ₂ air than required stoipercentage of N ₂ in the	chiometrically. Assu	lar ba ming	sis. Methane (CI- complete combi	I ₄) is istion	burned with 50% excess of methane, the molar
	(1) 70	(2) 73.8	(2)	75	(4)	79.8
6:	Heat and Work are: (1) Intensive propert	ies	, ,	Extensive prope	rties	
	(3) Point functions		(4)	Path functions		
7.	The internal energy of	f an ideal gas is a fun				
	(1) Temperature and(3) Entropy and press	•	, ,	Volume and pre- Temperature onl		
8.	The Rateau turbine be	long to the category	of:			
	(1) Pressure compoun					
	(3) Velocity compour	nded turbine	(4)	Radial flow turb	ine	
9.						with in the element, the of stress at the point is:
	(1) 0.5 unit	(2) 0 unit	(3)	01 unit	(4)	2 units
10.	For a Newtonian fluid					
	(1) Shear stress is pro			Laster to the		
	• /	ss is proportional to				
	(3) Shear stress is pro(4) Rate of shear stres	portional to rate of sl ss is proportional to r				- 1)·
MPH/P	HD/URS-EE-2019/(M			man lyn		P. T. C
		007	, , ,			~

11.	loses 20% of its acceleration due	impact velocity a to gravity is 10 m	fter each collision w /s ² and that air resis	a velocity of 4 m/s at time, with the ground. Assuming stance is negligible, the matotal time (in seconds) of: (4) 6	that the
12.	 Increases line Decreases line 	early with the true seearly with the true seearly with the true sees sees and then	al. The true stress bey train strain decreases linearly wit		
13.	The spring consta (1) Coil diameter (3) Number of ac	ŗ į	oression spring DOES (2) Material (4) Wire diår	strength	
14.	method of riser de	esign. Assume that	the bottom surface of	100 mm is to be cast using recylindrical riser does not cost height, then the height of the second (4) 125	ntribute
15.			oss-section of side a decreases approximate (3) 41%	is subjected to an end load ly by: (4) 50%	. If a is
16.	through the wall i	s 1000 Wand the st	urrounding temperatur	at 300 K. The rate of heat re is 25°C. Assuming no ger t transfer through the wall is (4) 244	neration
17.	The saturation proof dry air) is:	essure of water at 35	5°C is 5.63 kPa. The l	The pressure in the room is 0 numidity ratio of the air (in g	.1 MPa grain/kg
18.	 Holds becaus Holds becaus Holds becaus 	(2) 22.20 y layer for a steady is the flow is steady the flow is incompet the flow is transition to because the flow is	oressible onal	(4) 20.37 the Bernoulli equation:	

			•		
19.		erage temperature of hermal efficiency the turbine exit ii) are correct	neat addition	with reheating are TRUE? ad (iii) are correct (iii) are correct	
20.		hen the speed of rotat		an I.C. engine measures 00 rad/s. The shaft torque	
	(1) 25	(2) 52	(3) 35	(4) 45	
21.	inner radius of th		it has wall thickness is:	d air at a pressure of 500 as of 10 mm. The magn	
	(1) 22	(2) 24	(3) 25	(4) 29	
22.	obtained is:			oth are straight lines, the	
	(1) Cylindrical	(2) Helical	(3) Plane	. (4) Surface of rev	olution
23.	amplitude and free damping factor is amplitude of vibra	quency walong the ax s 0.2 and the undam tion (in m) is approxing	is of the spring. The ped natural frequent mately:	to a sinusoidal force stiffness of the spring is lacy is 10w. At steady s	150 N/m
	(1) 0.05	(2) 0.07	(3) 0.70	(4) 0.90	
24.	maximum permiss times the outer dia the shaft is:	sible angle of twist in meter. The modulus of	the shaft is 1°. The of rigidity is 80 GPa.	ower of 30 kW at 700 r inner diameter of the sha The outside diameter (in	aft is 0.7
	(1) 44.5212 mm	(2) 54.5212 mm	(3) 64.5212 mr	n (4) 48.5212 mm	
25.	. The atomic packin	g factor for a material	with body centered	cubic structure is:	
	(1) 0.68	(2) 0.53	(3) 0.89	(4) 0.87	4
26.	200 N.m ² is subje	cted to an applied mo	oment $M_A = 1.0 \text{ N-r}$	th 10 m and flexural rigion at the free end as show end is (mm round o	vn in the
	(1) 2.5	(2) 1.5	(3) 3.5 b	(4) 0.5 I _A	
			1.0 111		

27.	by application of pur	e bending moments a		circular arc of radius 1.0 mm modulus of the material of wire is (MPa):
	(1) 60	(2) 70	(3) 50	(4) 55
28.	A small ball of mass with a stationary ball mass ball after the im	of mass 2 kg. The in	velocity of 12 m/s und npact is perfectly elast	ergoes a direct central impact ic. The speed (in m/s) of 2 kg
	(1) 4	(2) 8	(3) 6	(4) 2
29.	pressure of the gas is	cylindrical tank of inr 2 MPa. The maximu	ner radius 7 in and wal m shear stress (in MPa)	l thickness 50 mm. The gage in the wall is:
	(1) 35	(2) 70	(3) 140	(4) 280
30.	spring constant is 8k.	stem is 0.1 kg/so In a	and the spring constant mother spring-mass systems coefficient (in kg/s) of	nt is k. The critical damping stem, the mass is 2m and the this system is:
	(1) 0.6	(2) 0.3	(3) 0.4	(4) 0.8
31.	is 24 hour per. The ex	spected time that a cu	stomer is in queue is (n	per hour and the serving rate nin):
	(1) 2.5	(2) 3.5	(3) 1.5	(4) 4.5
32.	The word Kanban is a	most appropriately ass	sociated with:	
	(1) Economic order		(2) Just in time prod	luction
	(3) Capacity plannin	g	(4) Product Design	•
33.	A company uses 255 point (in number of u			ime is 08 days. The recorder
	(1) 07	(2) 08	(3) .56	(4) 60
34.		10 & 50 units. In solve of capacity 40 units in ation of capacity 40 units as the problem is into	ring this transportation is needed nits is needed feasible	y while the demand at four problem:
35.	Which one of the follostage?	owing is NOT a decis	sion taken during the a	ggregate production planning
	(1) Scheduling of Ma			
	(2) Amount of labour			
	(3) Rate at which pro	* *	en	1
DYY A	(4) Inventory to be early (4)			4
r:r://	**************************************	acen Engg L(SET.)	AH (2)	

36.	Production flow analysis (PFA) is a method of identifying part families that uses data from:					
	(1) Engineering Drawing	(2) Production sched	lule			
	(3) Bill of Materials	(4) Route Sheet				
37.	Which of the following forecasting method the next period forecast?	ds takes a fraction of fo	precast error into account for			
	(1) Simple average Method	(2) Moving average	method			
	(3) Weighted Moving average method	(4) Exponential smo	othing method			
38.	The time series forecasting method that giobservations is:	ives equal weightage to	o each of the m most recent			
	(1) Moving average method	(2) Exponential smo	othing with linear trend			
	(3) Triple Exponential smoothing	(4) Kalman Filter	•			
39.	Two models, P and Q, of a product earn production times for P and Q are 5 hours at time available is 150 hours. For a total base units of P to be produced is:	nd 3 hours, respectivel	y, while the total production			
	(1) 12 (2) 15	(3) 18	(4) 20			
40.	In a company with 100 employees, 45 earn Rs. 40,000,8 earn Rs. 60,000, and 2 earn Rs.	Rs. 20,000 per month, s. 150,000. The median	25 earn Rs. 30,000, 20 earn of the salaries is:			
	(1) Rs. 20,000 (2) Rs.30,000	(3) Rs. 32,300	(4) Rs. 40,000			
41.	The most common limit gage used for inspe	ecting the hole diamete	ris:			
	(1) Ring gage	(2) Snap gage				
	(3) Plug gage	(4) Master gage				
42.	A gas tungsten arc welding operation is performed using a current of 250 A and an arc voltage of 20 V at a welding speed of 5 mm/s. Assuming that the arc efficiency is 70%, the net heat input per unit length of the weld will be (kJ/mm -round off to one decimal place).					
	(1) 0.7 (2) 0.9	(3) 0.4	(4) 0:3			
43.	Hardenability of steel is a measure of: (1) The ability to harden when it is cold worked (2) The maximum hardness that can be obtained when it is austenitized and then quenched (3) The ability to retain its hardness when it is heated to elevated temperatures					
	(4) The depth to which required harden quenched		e en			
MPH/I	PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(C)	P. T. O			

			•
44.	The cold forming process in which a hardened to is relative motion between the tool and the wor regular pattern is:	ool is pressed agai k piece) to produc	nst a work piece (when there e a roughened surface with a
	(1) Strip rolling (2) Knurling (3)	Roll forming	(4) Chamfering
45.	. The preferred option for holding an odd-shaped	workpiece in a cer	ntre lathe is:
	(1) Live and dead centres (2)	Three jaw chuck	
	(3) Lathe dog (4)	Four jaw chuck	
46.	sectional area of the weld bead is 20 mm ² . The the specific energy of melting is 14 J/mm ³ . A process 70%, the welding speed is (in mm/s of	work-piece and file Assuming a thermal	ller are of titanium for which al efficiency of the welding mal places):
	(1) 7.5 (2) 8.5 (3)	9.5	(4) 5.5
47.	 Feed rate in slab milling operation is equal to: (1) Rotation per minute (rpm) (2) Product of rpm and number of teeth in the (3) Product of rpm, feed per tooth and number (4) Product of rpm, feed per tooth and number 	of teeth in the cutte	
48.	(1) Coarse and randomly oriented (2)	e grains in the casti Fine and random Coarse and order	ly oriented
49.	(1) Ion displacement (2)	akes place through Melting and vapo Plastic shear	
50.	In a wire-cut EDM process the necessary c successful cut are that: (1) Wire and sample are electrically non-conduction (2) Wire and sample are electrically conductin (3) Wire is electrically conducting and sample (4) Sample is electrically conducting and wire	ncting g is electrically non-	-conducting
51.	cycle is 1000 kPa. For air, assume specific heat kJ/kg.K, If the pressure and temperature at the kPa and 300 K, respectively, then the specific off to two decimal places):	ratio y = 1.4 and spee beginning of the net work output of	ecific gas constant R = 0.287 compression stroke are 100 f the cycle is (kJ/kg round
	(1) 608.6 (2) 908.6 (3)		(4) 1008.8
MPH/	//PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(C		· 1985年,第二日公司,1985年,1985年

. 0	7
52.	An idealized centrifugal pump (blade outer radius of 50 mm) consumes 2 kW power while running at 3000 rpm. The entry of the liquid into the pump is axial and exit from the pump is radial with respect to impeller. If the losses are neglected, then the mass flow rate of the liquid through the pump is (kg/s round off to two decimal places): (1) 8.106 (2) 7.106 (3) 6.106 (4) 9.106
53.	A through hole is drilled in an aluminum alloy plate of 15 mm thickness with a drill bit of diameter 10 mm, at a feed of 0.25 mm/rev and a spindle speed of 1200 rpm. If the specific energy required for cutting this material is 0.7 N.m/mm ³ , the power required for drilling is (W round off to two decimal places): (1) 276.9 (2) 274.89 (3) 278.9 (4) 277.89
54.	One-dimensional steady state heat conduction takes place through a solid whose cross-sectional area varies linearly in the direction of heat transfer. Assume there is no heat
	generation in the solid and the thermal conductivity of the material is constant and independent of temperature.
	The temperature distribution in the solid is:
	(1) Ouadratic (2) Exponential (3) Logarithmic (4) Linear
55.	Which one of the following modifications of the simple ideal Rankine cycle increases the thermal efficiency and reduces the moisture content of the steam at the turbine outlet:
	(1) Decreasing the condenser pressure. (2) Increasing the boiler pressure.
	(3) Decreasing the boiler pressure. (4) Increasing the turbine inlet temperature.
56.	Water enters a circular pipe of length $L=5.0~\text{m}$ and diameter $D=0.20~\text{m}$ with Reynolds number $R_{eD}=500$. The velocity profile at the inlet of the pipe is uniform while it is parabolic at the exit. The Reynolds number at the exit of the pipe is:
	(1) 450 (2) 550 (3) 500 (4) 600
57.	Ambient air is at a pressure of 100 kPa, dry bulb temperature of 30°C and 60% relative humidity. The saturation pressure of water at 30°C is 4.24 kPa. The specific humidity of air (in g/kg of dry air) is (correct to two decimal places):
	(1) 16.24 (2) 17.24 (3) 18.24 (4) 15.24
58.	The peak wavelength of radiation emitted by a black body at a temperature of 2000 K is 1.45 um. If the peak wavelength of emitted radiation changes to 2.90 um, then the temperature (in K) of the black body is:
	(1) 500 (2) 1000 (2) 4000 (4) 8000
59.	Select the correct statement for 50% reaction stage in a steam turbine.
00,	(1) The rotor blade is symmetric.
	co office effects blade is symmetric.
	and the short inlet flow angle is equal to absolute exit flow angle.
	(4) The absolute exit flow angle is equal to inlet angle of rotor blade.
MPH/P	HD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(C)

60	 Which one of the follo (1) Its pressure is less (2) Its temperature is less (3) Its volume is less to (4) Its enthalpy is less 	than the saturation paless than the saturation than the volume of the	ressi on tei e sat	ire at a given temp mperature at a giv urated vapour at a	oeratur en pres given	re. ssure. temperature.
61.	Internal gears are manu				-	
	(1) Hobbing(3) Shaping with rack	cutter	(2) (4)	1 0	ion cu	tter ,
62.	For an orthogonal cutt 0.8 mm, speed is 48 m/	ing operation, tool m	nateri	ial is HSS, rake a	ngle is angle (4) 6	(in degrees] is:
63.			` '		(4)	
	(1) Reduce directional	solidification		Help local alloying	ng of n	nolten metal
	(3) Help easy removal of	of core from casting	(4)	Prevent core mov	ement	due to buoyancy
64.	An expandable pattern	is used in :				
	(1) Slush casting		(2)	Squeeze casting		
	(3) Centrifugal casting		(4)	Investment castin	g	
65.	In the manufacture of the	ne twist drills, the sha	nk i	s joined to the bod	ly of th	ne drill using:
	(1) Spot Welding			TIG Welding		8
	(3) Projection Welding	<u> </u>	(4)	Friction Welding		
66.	The annual requirement supplied in units of 1 l annual cost of carrying days) will be:	kg costing Rs. 25 ea	ch.	If it costs Rs. 10	0 to n	lace an order and the
	(1) 73 (2	2) 77	(3)	80	(4) 8	5
67.	A manufacturer has the	following data regard	ding	a product :		
	Fixed cost per month $= 1$	Rs. 50000		19		
	Variable cost per unit =	Rs. 200				
	Selling price Per unit = I	Rs. 300				
	Production capacity $= 15$	500 units per month				
	If the production is carr is:	ied out at 80% of th	e rat	ted capacity, then	the n	nonthly profit (in Rs.)
	(1) 60,000 (2	70,000	(3)	57,000	(4) 7	72 000
MPH/P	HD/URS-EE-2019/(Mcc	ch. Engg.)-(SET-ZM	(C)	- 7,000	(4) /	72,000
			(~)	The Market of the Control of the Control		

74. A local tyre distributor expects to sell approximately 9600 steel belted radial tyres next year. Annual carrying cost in Rs. 16 per tyre and ordering cost is Rs. 75. The economic order quantity of the tyres is:

(1) 64

(2) 212

(3) 300

(4) 1200

75. The time series forecasting method that gives equal weightage to each of the M most recent observation is:

- (1) Moving average method
- (2) Exponential smoothing with linear trend
- (3) Triple Exponential smoothing
- (4) Kalman Filter

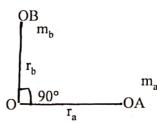
MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(C)

P. T. O.

76.	Four red balls, four green balls and four blue balls are put in a box. Three balls are pulled ou
	of the box at random one after another without replacement. The probability that all the three
	balls are red is:

- (1) 1/72
- (2) 1/55
- (3) 1/36
- (4) 1/27
- 77. At a work station, 05 jobs arrive every minute. The mean time spent on each job in the work station is 1/8 minute. The mean steady state number of jobs in the system is:
 - (1) 1.666
- (2) 1.888
- (3) 1.777
- (4) 1.999
- **78.** The jobs arrive at a facility for a service, in a random manner. The probability distribution of number of arrivals of jobs in a fixed time interval is:
 - (1) Normal
- (2) Poisson
- (3) Erlang
- (4) Beta

- 79. Little's law is a relationship between:
 - (1) Stock level and lead time in an inventory system
 - (2) Waiting time and length of queue in a queuing system
 - (3) Number of machines and job due dates in a scheduling problem
 - (4) Uncertainty in the activity time and project completion time
- **80.** For a single server with passion arrival and exponential service time, the arrival rate is 12 per hour. Which one of the following service rates will provide a steady state finite queue length?
 - (1) 06 per hour
- (2) 10 per hour
- (3) 12 per hour
- (4) 24 per hour
- 81. Two masses A and B having mass m_a and m_b, respectively, lying in the plane of the figure shown, are rigidly attached to a shaft which revolves about an axis through O perpendicular to the figure. The radii of rotation of the masses m_a and m_b are r_a and r_b respectively. The angle between lines OA and OB is 90°. If m_a = 10 kg, m_b = 20 kg, r_a = 200 mm and r_b = 400 mm, then the balance mass to be placed at a radius of 200 mm is (kg --- round off to two decimal places):
 - (1) 41.23
- (2) 42.23
- (3) 40.23
- (4) 43.23



- 82. The thickness of a sheet is reduced by rolling (without any change in width) using 600 mm diameter rolls. Neglect elastic deflection of the rolls and assume that the coefficient of friction at the roll-work piece interface is 0.05. The sheet enters the rotating rolls unaided. If the initial sheet thickness is 2 mm, the minimum possible final thickness that can be produced by this process in a single pass is (mm -- round off to two decimal places):
 - (1) 1.35
- (2) 1.25
- (3) 1.45
- (4) 1.15

MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(C)

	100 MPa along the length direction. Assume plane stress conditions in the plane normal to the thickness. The Young's modulus $E = 200$ MPa and Poisson's ratio $v = 0.3$ are given. The principal strains in the plane of the sheet are:						
	(1) (0.5, 0.0)	(2) (0.35, -0.15)		(0.5, -0.5)	(4)	(0.5, -0.15)	
84.	Sphere 1 with a diam m . The view factor F_1	eter of 0.1 m is complete:	letely	enclosed by anot	her s	sphere 2 of diameter	er 0.4
	(1) 0.25	(2) 0.0625	(3)	1.0	(4)	0.5	j.
85.	The state of stress at MPa centered at 200 point, the normal stre same point is (MPa):	MPa on the normal ss is 260 MPa. The ma	stres	s axis. On a plan	e pa	ssing through the	same
	(1) 80	(2) 90	(3)	60	(4)	70	
86.	(3) Decrease in the s		ncrea decre incre	se in the size of the ase in the size of the ase in the size of th	ne be the b he be	eam eam	
87.	Which of the following (1) Soderberg (3) ASME Elliptic	ng is the most conserv	(2)	fatigue failure cri Modified Goodn Gerber		n ?	, , , , , , , , , , , , , , , , , , ,
88.	Pre-tensioning of a b (1) Strain harden the (3) Increase stiffnes	e bolt head	7 7	Decrease stiffnes Prevent yielding		•	
89.	For an Oldham coupling used between two shafts, which among the following statements are correct? I. Torsional load is transferred along shaft axis. II. A velocity ratio of 1:2 between shafts is obtained without using gears III. Bending load is transferred transverse to shaft axis. IV. Rotation is transferred along shaft axis:						
	(1) I and II	(2) I and IV	. ' '	II and III	` '	II and IV	
90.	(1) Below 0.5	al load on the bearing (2) 0.5 to 0.8	(3)	0.8 to 1.0	life (4)	in 10° revolutions) Above 1.0	is:
91.	50% the ratio of new	ol life equation with or tool life to original to (2) 2	exponol life (3)	e is:		ting speed is reduce	ed by
Mn	(1) 4 PHD/URS-EE-2019/(٠,,		(+)	vi.	TO
MIN!	LHD/0K2-FF-5012/(-), (0)			a redes a market series : L	. I. U.

92.	Interpolator in a CNC machine: (1) Controls spindle speed (3) Operates tool changer	(2) Coordinates axes movements(4) Commands canned cycle			
93.	The non-traditional machining process that (1) Electron beam machining	essentially requires vacuum is: (2) Electro chemical machining			
	(3) Electro chemical discharge machining	(4) Electro discharge machining			
94.	method of riser design. Assume that the bo	n and height of 100 mm is to be cast using modulus of the surface of cylindrical riser does not contribute (ser is equal to its height, then the height of the riser (3) 100 (4) 125			
95.					
55.	Which two of the following joining proces (i) Diffusion welding	(ii) Electroslag welding			
	(iii) Tungsten inert gas welding	(iv) Friction welding			
	(1) (i) and (iv) (2) (ii) and (iii)	(3) (ii) and (iv) (4) (i) and (iii)			
96.	In fill mould (cavity-less) casting process,	the pattern is made of:			
	(1) Expanded polystyrene	(2) Wax			
	(3) Epoxy	(4) Plaster of Paris			
97.	cutting speed of 180 m/min. the thrust force	gle is used in an orthogonal machining process. At a e is 490 N. If the coefficient of friction between the sumption (in kW) for the machining operation is:			
	(1) 3.5 (2) 2.1	(3) 5.6 (4) 7.1			
98.		ach of volume 1000 cm ³) were cast under identical the cube was 4 s. The solidification tune (in s) for			
	(1) 6.57355 sec. (2) 7.23455 sec.	(3) 5.23455 sec. (4) 2.52355 sec.			
99.	respectively, when the welding speed was carried out at a welding speed of 120 mm	current and arc voltage were 50 A and 60 V. 150 mm/min. In another process, the TIG welding is d/min at the same arc voltage and heat input to the time the welding current (in A) for this process is: (3) 55.90 (4) 62.25			
100		ys (without any addition of fluxes) increases with			
100.	increase in:	ys (without any addition of fluxes) increases with			
	(1) Freezing range	(2) Surface tension			
	(3) Degree of superheat	(4) Viscosity			
MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(C)					

Total No. of Printed Pages: 13

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

D

M.Phil./Ph.D./URS-EE-2019

SET-Z

SUBJECT: Mechanical Engineering

10004 Sr. No.

Time: 11/4 Hours	Max. Marks: 100	Total Questions: 100
Roll No. (in figures)	(in words)	
Name	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 unfairmeans / 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 will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E.Mail within 24 hours of uploading the same on the University Website. 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 will be no negative marking. 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.

MPH/PHD/URS-EE-2019/(Mech. Engg.)(SET-Z)/(D)

	1.	Internal gears are manufactured by: (1) Hobbing (3) Shaping with rack cutter	(2) (4)	Shaping with pinion cutter Milling		
	2.	For an orthogonal cutting operation, tool model 0.8 mm, speed is 48 m/min and feed is 0.4 mm (1) 19.24 (2) 29.70	ım/r			
	3.	Chaplets are placed between mould and core (1) Reduce directional solidification (3) Help easy removal of core from casting	(2)	faces in order: Help local alloying of molten m Prevent core movement due to		
	4.	An expandable pattern is used in: (1) Slush casting (3) Centrifugal casting	` `	Squeeze casting Investment casting		
	5.	In the manufacture of the twist drills, the sha (1) Spot Welding (3) Projection Welding	(2)	s joined to the body of the drill u TIG Welding Friction Welding	sing:	
	6.	The annual requirement of rivets at a ship manufacturing company is 2000 kg. The rivets are supplied in units of 1 kg costing Rs. 25 each. If it costs Rs. 100 to place an order and the annual cost of carrying one unit is 9% of its purchase cost, the cycle length of the order (in days) will be:				
		(1) 50	(3)	80 (4) 85		
-	7.	A manufacturer has the following data regard Fixed cost per month = Rs. 50000 Variable cost per unit = Rs. 200 Selling price Per unit = Rs. 300 Production capacity = 1500 units per month If the production is carried out at 80% of the			profit (in Rs.)	
	•	18:			prom (m rcs.)	
			` '	57,000 (4) 72,000		
	8.	During the development of a product, an enlogic, examination of geometry and toleran known as:	itire ce i	ly new process plan is made ban formation. This type of process	sed on design	
			(2)	Generative		
MI) 		(4)	Group technology based		
4411	11/1	PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/	(IJ)		P. T. O.	

9.	Annual demand of a pro Considering the basic eco units When the annual in is:	onomic order quan	tity	model, the econo	mic	order quantity is 100	000
	(1) 35,000 (2)	43,330	(3)	45,000	(4)	65,000	
10.	The chance of a student and getting above 90% reprobability that the student (1) 1/19	narks in it is 5%. (nt gets above 90% i	GIV)	EN that a student	a st	udent passing the ex-	am the
		1/4	` ,	2/9	. ,	5/18	
11.	Using the Taylors tool li 50% the ratio of new tool	fe equation with ex life to original too	kpon l life	ent $n = 0.5$, if the is:	cutt	ing speed is reduced	by
	(1) 4	2	(3)	1	(4)	0.5	
12.	Interpolator in a CNC ma (1) Controls spindle spec (3) Operates tool change	ed	(2) (4)	Coordinates axes Commands canno			
13.					_		
10.	The non-traditional mach (1) Electron beam mach						
	(3) Electro chemical disch	•		Electro chemical Electro discharge			
14.	A cylindrical job with di method of riser design. A as cooling surface. If the [in mm] is: (1) 150 (2)	Assume that the bot	and tom er is	height of 100 mm surface of cylindri equal to its heigh	is to cal r	o be cast using modulariser does not contribute the height of the rise	ıta
4			` '	100		125	
15.	Which two of the following (i) Diffusion welding	ing joining processe					
	(iii) Tungsten inert gas w	velding		Electroslag welding Friction welding	ng .		
		(ii) and (iii)		(ii) and (iv)	(4)	(i) and (iii)	
16.	In fill mould (cavity-less)) casting process, th	ne pa	ttern is made of:			
	(1) Expanded polystyrer	ne	(2)	Wax			
	(3) Epoxy		(4)	Plaster of Paris		, was a proof	
17.	A single point cutting too cutting speed of 180 m/m tool and the chip is 0.7, the	nin. the thrust force then the power cons	is 4	90 N. If the coeffi	cien	t of friction between t	he
	(1) 3.5	2.1	(3)	5.6	(4)	7.1	

(4) 2.52355 sec.

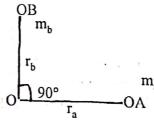
the sphere is:

	(1) 6.57355 sec.	(2) 7.23455 sec.	(3)	5.23455 sec.	(4)	2.52355 sec.
19.	respectively, when the carried out at a weld	e welding speed was ling speed of 120 mm	150 n /min ime tl	nm/min. In anothe at the same arc v	r pro volta (in .	were 50 A and 60 V. cess, the TIG welding is ge and heat input to the A) for this process is:
20.		en metal of cast allo	ys (v	rithout any addition	on o	f fluxes) increases with
	increase in :(1) Freezing range(3) Degree of superh	neat	(2) (4)	Surface tension Viscosity		
21.	cycle is 1000 kPa. Fo kJ/kg.K, If the press	r air, assume specific lure and temperature a ectively, then the spec	neat rat the	atio y = 1.4 and specification beginning of the	com the	effective pressure of the c gas constant R = 0.287 apression stroke are 100 cycle is (kJ/kg round 1008.8
22.	An idealized centrifurunning at 3000 rpm.	. The entry of the liqu	id in s are vo de	to the pump is axineglected, then the	al an mas	mes 2 kW power while and exit from the pump is as flow rate of the liquid 9.106
23.	A through hole is dr diameter 10 mm, at	rilled in an aluminum a feed of 0.25 mm/re cutting this material is	alloy ev and 0.7 N	y plate of 15 mm d a spindle speed	of 1: er re	kness with a drill bit of 200 rpm. If the specific quired for drilling is (W
24.	4. One-dimensional steady state heat conduction takes place through a solid whose cross-sectional area varies linearly in the direction of heat transfer. Assume there is no heat generation in the solid and the thermal conductivity of the material is constant and independent of temperature.					
	_	ribution in the solid is			(4)	
	(1) Ouadratic	(2) Exponential			(4)	Linear
IPH/I	PHD/URS-EE-2019/(Mech. Engg.)-(SET-2	Z)/(D)			Р. Т. О

18. A cube and a sphere made or cast iron (each of volume 1000 cm³) were cast under identical

conditions. The time taken for solidifying the cube was 4 s. The solidification tune (in s) for

- 4
- 25. Which one of the following modifications of the simple ideal Rankine cycle increases the thermal efficiency and reduces the moisture content of the steam at the turbine outlet:
 - (1) Decreasing the condenser pressure.
- (2) Increasing the boiler pressure.
- (3) Decreasing the boiler pressure.
- (4) Increasing the turbine inlet temperature.
- **26.** Water enters a circular pipe of length L = 5.0 m and diameter D = 0.20 m with Reynolds number $R_{cD} = 500$. The velocity profile at the inlet of the pipe is uniform while it is parabolic at the exit. The Reynolds number at the exit of the pipe is:
 - (1) 450
- (2) 550
- (3) 500
- (4) 600
- 27. Ambient air is at a pressure of 100 kPa, dry bulb temperature of 30°C and 60% relative humidity. The saturation pressure of water at 30°C is 4.24 kPa. The specific humidity of air (in g/kg of dry air) is (correct to two decimal places):
 - (1) 16.24
- (2) 17.24
- (3) 18.24
- (4) 15.24
- 28. The peak wavelength of radiation emitted by a black body at a temperature of 2000 K is 1.45 um. If the peak wavelength of emitted radiation changes to 2.90 um, then the temperature (in K) of the black body is:
 - (1) 500
- (2) 1000
- (2) 4000
- (4) 8000
- 29. Select the correct statement for 50% reaction stage in a steam turbine.
 - (1) The rotor blade is symmetric.
 - (2) The stator blade is symmetric.
 - (3) The absolute inlet flow angle is equal to absolute exit flow angle.
 - (4) The absolute exit flow angle is equal to inlet angle of rotor blade.
- 30. Which one of the following statement is correct for a superheated vapour:
 - (1) Its pressure is less than the saturation pressure at a given temperature.
 - (2) Its temperature is less than the saturation temperature at a given pressure.
 - (3) Its volume is less than the volume of the saturated vapour at a given temperature.
 - (4) Its enthalpy is less than enthalpy of the saturated vapour at a given pressure.
- 31. Two masses A and B having mass m_a and m_b, respectively, lying in the plane of the figure shown, are rigidly attached to a shaft which revolves about an axis through O perpendicular to the figure. The radii of rotation of the masses m_a and m_b are r_a and r_b respectively. The angle between lines OA and OB is 90°. If m_a = 10 kg, m_b = 20 kg, r_a = 200 mm and r_b = 400 mm, then the balance mass to be placed at a radius of 200 mm is (kg --- round off to two decimal places):
 - (1) 41.23
- (2) 42.23
- (3) 40.23
- (4) 43.23



MPH/PHD/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(D)

32.	diameter rolls. Neglect at the roll-work piece in sheet thickness is 2 mm process in a single pass	clastic deflection of sterface is 0.05. The n, the minimum pos	the r shee ssible to tw	olls and assume the colors the rotation of the final thickness the colors of the colors and the colors of the colo	nat tl g ro hat c	n width) using 600 mm he coefficient of friction lls unaided. If the initial can be produced by this
33.	100 MPa along the leng thickness. The Young's principal strains in the p	th direction. Assum modulus E = 200	e pla MPa	ne stress condition and Poisson's rat	ns in io	uniaxial tensile stress of the plane normal to the v = 0.3 are given. The (0.5, -0.15)
34.	m. The view factor F ₁₂ i					sphere 2 of diameter 0.4
35.	The state of stress at a MPa centered at 200 M point, the normal stress same point is (MPa):	point in a compone MPa on the normal	nt is	s axis. On a pland ade of the shear sta	Mole pa	0.5 hr's circle of radius 100 ssing through the same on the same plane at the
36.	Endurance limit of a beautiful (1) Increase in the surful (2) Decrease in the surful (3) Decrease in the surful (4) Increase in the surful (5)	am subjected to pure ace roughness and ir face roughness and of face roughness and i	beno berea decre nerea	ding decreases wit se in the size of th ase in the size of t ase in the size of the	h: e bea he be	am eam eam
37.	Which of the following (1) Soderberg (3) ASME Elliptic		(2)	fatigue failure crit Modified Goodm Gerber		n ?
38.	Pre-tensioning of a bolt (1) Strain harden the bo (3) Increase stiffness of	olt head		Decrease stiffnes Prevent yielding		•
39.	For an Oldham coupling correct?	g used between two	shaf	ts, which among	the f	ollowing statements are
	I. Torsional load is traII. A velocity ratio ofIII. Bending load is transferIV. Rotation is transfer		s obta o sha	nined without usin		ars II and IV
MPH/I	(1) I and II (2 PHD/URS-EE-2019/(Me	4				

40.	A self-aligning ball bearing has a basic dynamic load rating (c ₁₀ , for 10 ⁶ revolutions) of 35 kN. If the equivalent radial load on the bearing is 45 kN, the expected life (in 10 ⁶ revolutions) is:
41.	(1) Below 0.5 (2) 0.5 to 0.8 (3) 0.8 to 1.0 (4) Above 1.0 In a single channel queuing model, the customer arrival rate is 12 per hour and the serving rate is 24 hour per. The expected time that a sustance is in recent is (a in).
1	is 24 hour per. The expected time that a customer is in queue is (min): (1) 2.5 (2) 3.5 (3) 1.5 (4) 4.5
42.	The word Kanban is most appropriately associated with: (1) Economic order quantity (2) Just in time production (3) Capacity planning (4) Product Design
43.	A company uses 2555 units of an item annually. Delivery lead time is 08 days. The recorder point (in number of units) to achieve optimum inventory is: (1) 07 (2) 08 (3) 56 (4) 60
44.	The supply at three sources is 50, 40 & 60 units respectively while the demand at four destination is 20, 30, 10 & 50 units. In solving this transportation problem: (1) A dummy source of capacity 40 units is needed (2) A dummy destination of capacity 40 units is needed (3) No solution exists as the problem is infeasible (4) No solution exists as the problem is degenerate
45.	Which one of the following is NOT a decision taken during the aggregate production planning stage? (1) Scheduling of Machines (2) Amount of labour to be committed (3) Rate at which production should happen (4) Inventory to be carried forward
46.	Production flow analysis (PFA) is a method of identifying part families that uses data from: (1) Engineering Drawing (2) Production schedule (3) Bill of Materials (4) Route Sheet
47.	Which of the following forecasting methods takes a fraction of forecast error into account fo the next period forecast? (1) Simple average Method (2) Moving average method (3) Weighted Moving average method (4) Exponential smoothing method
48.	The time series forecasting method that gives equal weightage to each of the m most recent observations is: (1) Moving average method (2) Exponential smoothing with linear trend (3) Triple Exponential smoothing (4) Kalman Filter

49.	Production times for P and Q are 5 hours and 3 hours, respectively, while the total production time available is 150 hours. For a total batch size of 40, to maximize profit, the number of units of P to be produced is:						
	(1) 12	(2) 15	(3) 18	(4) 20			
50.			n Rs. 20,000 per montl ss. 150,000. The media	h, 25 earn Rs. 30,000, 20 earn n of the salaries is :			
	(1) Rs. 20,000	(2) Rs.30,000	(3) Rs. 32,300	(4) Rs. 40,000			
51.	The most common lin	mit gage used for insp	ecting the hole diamet	er is :			
	(1) Ring gage	•	(2) Snap gage				
	(3) Plug gage		(4) Master gage				
52.	of 20 V at a welding	g speed of 5 mm/s. A	~	at of 250 A and an arc voltage fficiency is 70%, the net heat decimal place).			
	(1) 0.7	(2) 0.9	(3) 0.4	(4) 0:3			
53.	(2) The maximum ha(3) The ability to ret	rden when it is cold wardness that can be obta tain its hardness when	ined when it is austenitiz it is heated to elevated	•			
54.	is relative motion beforegular pattern is:	tween the tool and the	work piece) to produc	inst a work piece (when there ee a roughened surface with a			
	(1) Strip rolling	(2) Knurling	(3) Roll forming	(4) Chamfering			
55.	The preferred option (1) Live and dead co (3) Lathe dog		aped workpiece in a ce (2) Three jaw chuck (4) Four jaw chuck	,			
56.	the specific energy of	weld bead is 20 mm ² . of melting is 14 J/mr	The work-niece and fi	l current = 100 A. The cross- ller are of titanium for which al efficiency of the welding mal places): (4) 5.5			
IPH/P	HD/URS-EE-2019/(N	Aech, Engg.)-(SET-7	(A)(D)				

57. Feed rate in slab milling operation is equal to:

(1) Rotation per minute (rpm)

	(2) Product of rpm and number of teeth in the cutter							
	(3) Product of rpm, fe	(3) Product of rpm, feed per tooth and number of teeth in the cutter						
		(4) Product of rpm, feed per tooth and number of teeth in contact						
58.	During solidification of		netal, the grains in the o	casting near the moule	d wall are:			
•	(1) Coarse and rando	mly oriented	(2) Fine and rand	lomly oriented				
	(3) Fine and ordered		(4) Coarse and o	rdered				
59.	Metal removal in elec-	tric discharge ma						
	(1) Ion displacement	,	(2) Melting and	vaporization				
	(3) Corrosive reaction	n	(4) Plastic shear					
60.	In a wire-cut EDM successful cut are that	:		have to be met for	making a			
	(1) Wire and sample							
	(2) Wire and sample	are electrically co	onducting	non conducting				
	(3) Wire is electrical	ly conducting and	I sample is electrically	non-conducting				
			and wire is electrically		1			
61.	The annual demand of valves per year in a company is 10,000 units. The current order quantity is 400 valves per order. The holding cost is Rs. 24 per valve per year and the ordering cost is Rs. 400 per order. If the current order quantity is changed to Economic Order Quantity, then the saving in the total cost of inventory per year will be (Rs. round off value to two decimal							
3.7	places). (1) 943.59	(2) 948.59	(3) 940.59	(4) 941.59				
62.	The probability that parts are selected randefective is (round or	ndomly and inspe	red by a company will cted, then the probabil places):	be defective is 0.05. ity that at least two p	If 15 such arts will be			
	(1) 0.19	(2) 0.17	(3) 0.14	(4) 0.13				
63	-a total area of de	ata 3, x, 2 and 4, t	hen the mode is:					
UU	(1) 4	(2) 2	(3) 3	(4) 0				
64		st in Rs. 16 per	l approximately 9600 s tyre and ordering cos	i is Rs. 75. The eco	es next year nomic order			
	(1) 64	(2) 212	(3) 300	(4) 1200				
MPH	(/PHD/URS-EE-2019/(Mech. Engg.)-(S	ET-Z)/(D)	A DE BANK OF FREE	Mark John			

•							
65.	. The time series forecasting method that gives equal weightage to each of the M most recent observation is:						
	(1) Moving average method						
		oothing with linea	J	•			
	(3) Triple Exponen	tiol amouth:	ir irend				
	(4) Kalman Filter	tial sillootning					
	(1) Raiman Filler						
66.	Four red balls, four of the box at randor balls are red is:	green balls and fon one after another	our blue balls are put in er without replacement	n a box. Three balls are The probability that a	pulled out		
	(1) 1/72	(2) 1/55	(3) 1/36	(4) 1/27			
67.	station is 1/8 minute	05 jobs arrive ever c. The mean steady	y minute. The mean ti	me spent on each job in the system is:	the work		
	(1) 1.666	(2) 1.888	(3) 1.777	(4) 1.999			
68.	The jobs arrive at a number of arrivals of	facility for a servi	ice, in a random mann me interval is :	er. The probability distr	ribution of		
	(1) Normal	(2) Poisson	(3) Erlang	(4) Beta			
69.	 Stock level and Waiting time and Number of mac 	lead time in an invad length of queue thines and job due of	ventory system in a queuing system dates in a scheduling pr d project completion ti				
70.	For a single server whour. Which one of to (1) 06 per hour	vith passion arriva the following servi (2) 10 per hour	l and exponential service rates will provide a (3) 12 per hour	ice time, the arrival rate steady state finite queue (4) 24 per hour	is 12 per length?		
71.	Which one of the following	lowing is NOT a re	otating machine 2				
	(1) Centrifugal pump	(2) Gear pump	(3) Jet pump	(4) Vane pump			
72.	Saturated steam at 10 C and exists at 50°e. (1) 55.76	00°C condenses on The value of the L (2) 58.46	of the outside of a tube. og Mean Temperature (3) 63.82	Cold fluid enters the tu Difference (LMTD) is (be at 20° (°C).		
73.	(4) 09.33						
Nan	(1) 0.222	(2) 0.267	(3) 0.298	(4) 0.316			
MPH/P	HD/URS-EE-2019/(M	Iech. Engg.)-(SE	Γ-Z)/(D)		P. T. O.		

,							1	
74.	A 10 mm deep cylindrical cup with diameter of 15mm is drawn from .circular blank Neglecting the variation in the sheet thickness, the diameter (upto 2 decimal points accuracy) of the blank is (mm):							
	(1) 27.12	(2) 28.72	(3)	29.49	(4)	33.41		
75.	Air contains 79% N ₂ air than required stopercentage of N ₂ in t (1) 70	ichiometrically. As		complete comb	ustion			
76.	Heat and Work are:	(2) 73.0	(2)	75	(1)			
	(1) Intensive properties(3) Point functions			(2) Extensive properties(4) Path functions				
77.	The internal energy	of an ideal gas is a f	function of	of:				
	(1) Temperature an(3) Entropy and pre	d pressure	(2)	Volume and pre Temperature on				
78.	The Rateau turbine I (1) Pressure compo (3) Velocity compo	unded turbine	(2)	Reaction turbine Radial flow turb				
79.	A two dimentional pressure is 1 unit. Re(1) 0.5 unit	luid element rotate adius of the Mohr's (2) 0 unit	circle, ch	igid body. At a paracteristics the so	state of	rith in the eler stress at the p 2 units	nent, the point is:	
80.	For a Newtonian flu	id :						
	 Shear stress is proportional to shear strain Rate of Shear stress is proportional to shear strain Shear stress is proportional to rate of shear strain Rate of shear stress is proportional to rate of shear strain 							
81.	A point mass is shot vertically up from ground level with a velocity of 4 m/s at time, $t = 0$. It loses 20% of its impact velocity after each collision with the ground. Assuming that the acceleration due to gravity is 10 m/s ² and that air resistance is negligible, the mass stops bouncing and comes to complete rest on the ground after a total time (in seconds) of: (1) 1 (2) 2 (3) 4 (4) 6							
82.	(1) Increases linear (2) Decreases linear (3) First increases (4) Remain constant	ly with the true stra rly with the true stra inearly and then de	in ain		tial yie	elding :		

(4) Remain constant

MPH/PIID/URS-EE-2019/(Mech. Engg.)-(SET-Z)/(D)

D

In a machining operation, if the generatrix and directrix both are straight lines, the surface

A single-degree-freedom spring-mass system is subjected to a sinusoidal force of 10 N

(2) Helical

(3) Plane

12

obtained is:

(1) Cylindrical

. **D**

(4) Surface of revolution

Mechanical Engg.

	Key of Entra	nce Exam -N	1.Phil/Ph.D/U	RS-EE-2019
Question_				
No.	CODE-A	CODE-B	CODE-C	CODE-D
1	3	1	3	2
2	3	2	3	2
3	2	4	2	4
4	1	3	2	4
5	1	1	2	4
6	1	1	4	2
7	3	1	4	2
8	2	3	1	4
9	3	2	2	1
10	3	1	3	2
11	1	1	3	1
12	2	2	1	2
13	4	3	2	1
14	3	2	1	1
15	1	2	4	1
16	1	3	2	1
17	1	4	1	2
18	3	1	4	1
19	2	2	3	1
20	1	2	1	3
21	3	2	3	3
22	1	2	3	1
23	2	4	2	2
24	1	4	1	3
25	4	4	1	4
	2	2	1	3
26	1	2	3	1
27		4	2	2
28	4	1	3	4
29	3		3	1
30	1	2	1	1
31	3		2	2
32	1	2	3	4
33	2	1		3
34	3	1	2	1
35	4	1	2 3	1
36	3	1		
37	1	2	4	3
38	2	1	1	
39	4	1	2	2
40	1	3	2	1
41	3	3	3	1
42	3	1	1	2
43	2	2	4	3
44	2	3	2	2
45	2	4	4	2
46	4	3	1	3
47	4	1	3	4
48	1	2	2	1
49	2	4	2	2
50	3	1	2	2
51	1	3	3	3

P 997/11/19

8 a 18/11/19

mechanical Fagg.

uestion_	ite y e i a i i i i		1.Phil/Ph.D/U	
No.	CODE-A	CODE-B	CODE-C	CODE-D
52	2	1	1	1
53	1	2	2	4
54	1	1	3	2
55	1	4	4	4
	1	2	3	1
56	2	1	1	3
57		4	2	2
58	1	3	4	2
59	1		1	2
60	3	1	2	1
61	3	3	2	2
62	1	3		3
63	4	2	4	3
64	2	2	4	1
65	4	2	2	2
66	1	4	2	1
67	3	4	The state of the s	2
68	2	1	4	2
69	2	2	2	4
70	2	3		3
71	2	3	1	3
72	2	1	2	2
73	4	4	3	2
74	4	2	1	2
75	4	4	2	4
76	2	1	1	4
77	2	3	2	1
78	1	2 2	2	2
79		2	4	3
80	2	3	1	3
81	2	3	2	1
82	3	2	4	2
83		1	3	1
84	3	1	1	4
85 86	2	1	1	2
87	1	3	1	1
88	2	2	3	4
89	2	3	2	3
90	4	3	1	
91	1	1	1	3
92	2	2	2	3
93	3	3	1	
94	2	3	1	2
95	2	1	1	
96	3	2		1
97	4	1	2	1
98	1	2		3
99	2	2	1	2
100	2	4	1	3