## **DEPT. OF** MECHANICAL ENGINEERING

*QUESTION BANK S4 ME* 

## **Question Bank**

## SUBJECT: MAT202 - PROBABILITY, STATISTICS AND NUMERICAL METHODS - 2023

## CLASS : S4 ME & CE

NoInterpretationsInterpretationsInterpretationsNorksUionrksU(Month/ Obj Year)ObjYear)Year)VolumeIA random variable X takes values 0,1, 2 and 3 with probabilities $P(X = 0) = \frac{8}{15}, P(X = 1) = \frac{1}{3}, P(X = 2) = P(X = 3) = \frac{1}{15}$ 7KTU- July 2017i. Find the mean and variance of X. If Y = 1000 + 300X i. find $P(Y \ge 1500)$ and $E[Y]$ In an examination, a candidate has to answer 15 multiple choice questions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions he8KTU- July 2017Remet 2017	rnet
IndextInstruction<	nal
MODULE 1(Month/ Year)Obj Year)1A random variable X takes values 0,1, 2 and 3 with probabilities $P(X = 0) = \frac{8}{15}, P(X = 1) = \frac{1}{3}, P(X = 2) = P(X = 3) = \frac{1}{15}$ 7KTU- July 2017i.Find the mean and variance of X. If $Y = 1000 + 300X$ i. find $P(Y \ge 1500)$ and $E[Y]$ 8KTU- July 20172In an examination, a candidate has to answer 15 multiple choice questions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions he8KTU- July 2017	
MODULE 11A random variable X takes values 0,1, 2 and 3 with probabilities $P(X = 0) = \frac{8}{15}, P(X = 1) = \frac{1}{3}, P(X = 2) = P(X = 3) = \frac{1}{15}$ 7KTU- July 2017Evali.Find the mean and variance of X. If $Y = 1000 + 300X$ i. find $P(Y \ge 1500)$ and $E[Y]$ 1000 + 300X8KTU- July 2017Remen July 20172In an examination, a candidate has to answer 15 multiple choice questions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions he8KTU- July 2017	ecu
MODULE 11A random variable X takes values 0,1, 2 and 3 with probabilities $P(X = 0) = \frac{8}{15}, P(X = 1) = \frac{1}{3}, P(X = 2) = P(X = 3) = \frac{1}{15}$ 7KTU- July 2017Evali.Find the mean and variance of X. If $Y = 1000 + 300X$ i. find $P(Y \ge 1500)$ and $E[Y]$ 8KTU- July 2017Remen July 20172In an examination, a candidate has to answer 15 multiple choice questions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions he8KTU- 2017	2S
1A random variable X takes values 0,1, 2 and 3 with probabilities $P(X = 0) = \frac{8}{15}, P(X = 1) = \frac{1}{3}, P(X = 2) = P(X = 3) = \frac{1}{15}$ 7KTU- July 2017Evaluation July 2017i. Find the mean and variance of X. If $Y = 1000 + 300X$ i. find $P(Y \ge 1500)$ and $E[Y]$ 8KTU- July 2017Remet July 20172In an examination, a candidate has to answer 15 multiple choice questions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions he8KTU- July 2017	
$P(X = 0) = \frac{8}{15}, P(X = 1) = \frac{1}{3}, P(X = 2) = P(X = 3) = \frac{1}{15}$ July 2017i.Find the mean and variance of X. If $Y = 1000 + 300X$ Image: Second Seco	uate
i.Find the mean and variance of X. If $Y = 1000 + 300X$ i.find $P(Y \ge 1500)$ and $E[Y]$ 20172In an examination, a candidate has to answer 15 multiple choice8KTU- July 20172In an examination, a candidate has to answer 15 multiple choice8KTU- July 2017	
i. find $P(Y \ge 1500)$ and $E[Y]$ III I I I I I I I I I I I I I I I I I	
2In an examination, a candidate has to answer 15 multiple choice8KTU- JulyRemequestions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions he2017	
questions each of which has 4 choices for the answer. He knows the correct answer to 10 questions and for the remaining 5 questions heJuly 2017	nber
correct answer to 10 questions and for the remaining 5 questions he	
chooses the answer randomly.	
(i)What is the probability that he answers 13 or more questions	
correctly?	
(ii) What is the mean and variance of the number of correct answers	
he gives?	. 1
3 The joint distribution of a two-dimensional random variable $(X, Y)$ is 8 KTU-May Under 2017	stand
given by $P(X, Y) = c(2x + 3y), x = 0, 1, 2 : y = 1, 2, 3$ .	
Find (1) the value of c	
(ii) the marginal distributions	
(111) Are X and Y independent?	
4 A box contains 100 cell phones, 20 of which are defective. 10 cell 8 K1U-JULY Eval	uate
1) at least one is defeative	
1) at least one is defective	
2) at most three are defective 3) none of them are defective	
4) all of them are defective	
5 The monthly breakdown of a computer follows Poisson Distribution 8 KTU-JULY Eval	uate
with mean 1.2. Find the probability that this computer will function 2017	
for a month	
a) without a break down	
b) with only one breaks down	
c) with at most two break down	
6 The probability that an electric component manufactured by a firm is 8 KTU-April Ap	ply
defective is 0.01. If the produced items are sent to the market in 2018	
packets of 10, find the number of packets containing exactly two	
defectives and at most two defectives in a consignment of 1000	
packets using	
(1) Dinomial distribution and (ii) Deisson ennovimation to binomial distribution	
(II) POISSON approximation to dinomial distribution	uato
by $n(X-r) - k^2r$ $r = 0.1.2.3.4$	uale

	Find (i) the value of k			
	(11) the probability that X is even and (iii) $F(X)$			
8	The joint probability distribution of X and Y is given by	7	KTU-May	Evaluate
	$f(x, y) = \frac{2x+3y}{54}$ for $x = 1, 2; y = 1, 2, 3$		2019	
	Find the (i)marginal distribution of x and y			
-	(ii) the conditional distribution of X for $Y = y$			TT 1 . 1
9	Show that Poisson distribution is the limiting case of	1	KU- MAY	Understand
			2015	
10	The probability of an item produced by a certain machine will	8	KU- May	understand
	be defective is 0.05. If the produced items are sent to the market		2019	
	(i) at least 2			
	(ii) exactly 2			
	(iii) at most 2defective items in a consignment of			
11	1000 packets using Poisson distribution	2	M. 1.1	. 1 1
11	Suppose X is binomial random variable with parameters $n = 100$ and	3	Model qp	understand
	p = 0.02. Find $P(X < 3)$ using Poisson approximation to X.			
12	The diameter of circular metallic discs produced by a machine is a	3	Model qp	Evaluate
	random variable with mean 6cm and variance 2cm. Find the mean area			
	of the discs.			
13	The probability mass function of a discrete random variable is	7	Model qp	Apply
	p(x) = kx, x = 1, 2, 3 where k is a positive constant.			
	Find (i) the value of <i>k</i>			
	(ii) $P(X \leq 2)$			
	(iii) $E[X]$ and			
	(iv) $Var(1 - X)$ .			
14	Accidents occur at an intersection at a Poisson rate of 2 per day. what	7	Model qp	Apply
	is the probability that there would be no accidents on a given day?			
	what is the probability that in January there are at least 3 days (not necessarily consecutive) without any accidents?			
15	Find the mean and variance of a binomial random variable	7	Model qp	Understand
16	The joint probability distribution of two discrete random variables <i>X</i>	7	KTU- JULY	Understand
	and <i>Y</i> is given by $p(x,y) = 130$ (x+y), x =0, 1, 2 y = 0, 1, 2, 3 Find the		2017	
17	correlation coefficient between X and Y.	7	Model an	Understand
17	Two fair dice are rolled. Let $X$ denote the number on the first die and	/	woder qp	Onderstand
	Y = 0 or 1, according as the first die shows an even number or odd			
	number. Find (1) the joint probability distribution of X and Y, (11) the marginal distributions. (iii) Are X and Y independent			
18	In a city, 4% of all licensed drivers will be involved in at least	8	KTU-	Apply
	one road accident in any given year. Use Poisson distribution		AUG2021	
	to determine the probability that among150 licensed drivers			
	randomly chosen in this city(1)only 5 will be involved in at least one road accident in any given year			
	Teast one road accredint in any given year.			

19	The joint distribution of two random variables X and Y is given by $f(x, y) = (x^{+y})^{/21}$ , $x = 1, 2, 3$ and $y = 1, 2$ . Find the marginal distributions of X and Y. Also find $E(X)$ and $E(Y)$ .						8	KTU- AUG2021	Apply	
20	The pr given	obability below.	distribu	tion functi	on of a rar	ndom var	iable X is	3	KTU- JUNE 2022	Analyse
	Х	0 1	1 2	3						
	f(x)	0.1 (	0.3 0.	4 0.2						
	Find E	C(Y) when	re Y = $X$	$^{2} + X.$						
21	8 coins no head	are tosse ls?	d 256 tin	nes. In hov	w many to	sses do y	ou expect	3	KTU- JUNE 2022	understand
22	Find <i>a</i> , is a rand	b if $Y =$	aX + b lable with	nas mean 4 mean 8 a	4 and variand variand	unce 16, v e 4.	where X	7	KTU- JUNE 2022	Apply
23	It is known that 2% of the bolts produced by a company are defective. The bolts are supplied in boxes of 200 bolts. What is the probability that a randomly chosen box contains not more than 5 defective bolts? In a consignment of 1000 such boxes how many can be expected to have more than 5 defective bolts?					7	KTU- JUNE 2022	Apply		
24	A rando	om variab	ole X has	the follow	ving proba	bility dis	tribution:	7	KTU- JUNE 2022	Apply
	X	-2	-1	0	1	2	3			
	(i) (ii)	Find th the mea	$\frac{15R^2}{15R^2}$ e value of an and value of an an and value of an	of k, ariance of	X.	0.3	<u>3K</u>			
25	The join 1,2,3; <i>P</i> ( <i>X</i> <	$\begin{array}{l} \text{ft pdf of } \\ y = 1, 2, \\ 3, Y \ge 2 \end{array}$	X, Y is g 3. Find ( ).	iven by $f$ i) k (ii) m	(x, y) = k aarginal pd	(x + 2y) f of X, Y	), x = (iii)	7	KTU- JUNE 2022	Apply
		_			MOD	ULE 2				
1	The time for super glue to set can be treated as a random variable having a normal distribution with mean30 seconds. Find the standard deviation if the probability is 0.20 that it will take on a value greater than 39.2 seconds				8	KTU-MAY 2017	Apply			
2	The tim distribu repair ti that a re exceeds	ted with ted with me exceed pair time 9 hours?	ed to repa a parame eds 2 hou e takes at ?	ir a machi eter0.5. Wi urs? What least 10	ine is expo hat is the p is the cond hours give	nentially probabilit litional p n that the	y that a robability duration	7	KTU- AUG2021	Apply

3	In an intelligence test administered to 1000 children the average	7	KTU-	Analyse
	mark was 60 and SD was 20. Assuming the marks the SD was		AUG2021	
	20 Assuming the marks obtained follow Normal distribution.			
	Find the number of children who have scored			
	(i)Above 90 marks			
	(ii)below 40 marks			
	(iii)between 50 and 80 marks?			
4	A random sample of size 100 is taken from a population	7	KTU-	Apply
	whose mean is 60 and variance is 400 Using Central Limit		AUG2021	
	Theorem find with what probability can we assert that the			
	mean of the sample will not differ from $\mu = 60$ by more than			
	4?			
5	Find the mean and variance of a random variable X which is	5	KTU-March	Understand
	uniformly distributed in the interval $[a,b]$		2017,2021	
6	A printer ink cartridge has a life of X hours under normal	8	KTU-JULY	Evaluate
	usage. The variable X is modelled by the probability density		2017	
	function			
	$(kx^2, x \ge 400)$			
	$F(x) = \{0, otherwise\}$			
	(i) Find <i>k</i>			
	(ii)Find the probability that such a cartridge has a life of at			
	least 600 hours of normal usage.			
	(iii) Find the probability that two cartridges will have to be			
	replaced before each has been used for 600 hours.			
7	Find the mean and variance of uniform distribution	5	KTU-May 2017	Remember
8	Buses arrived at a specified stop at 15 minute intervals starting	7	KTU-	Understand
	at 8AM. A passenger arrives at the stop at random time		MARCH	
	between 8 AM and 8.30 AM. Find the probability that he waits		2017, JUNE	
	(i)less than 5 minutes.		2022	
	(ii) at least 12 minutes			
9	Find the mean and variance of exponential distribution	5	KTU –May	Remember
			2017, June	
			2022	
10	The mileage which a car owner gets with a certain kind of tyre	7	KTU –May	Apply
	is a random variable having an exponential distribution with		2019	
	mean 60,000 km .Find the probability that one of the tyres will			
	last(i) at least 50,000km (ii)at most 60,000 km			
11	The litetime of a battery is exponentially distributed. 40% of such	5	KTU-May	understand
	batteries do not last longer than 1000 hours. Mr. Kumar purchased		2017	
	such a battery which is already used for 500 hours? What is the			
12	The probability density function of a random variable is given	7	KTU-	Evaluate
12	$(br^2 \ 0 < r < 1)$	,	July 2017	Liuluit
	$by f(x) = \begin{cases} nx & 0 < x < 1 \\ 0 & otherwise \end{cases}$		-	
	$\begin{array}{c} (0,0) \\ \text{Find} \\ a \\ k \end{array}$			
	b) Mean			
	c) $n(14 < X < 34)$			
	d) $p(X > 23)$			
	by $f(x) = \begin{cases} hx & 0 \le x \le 1 \\ 0, otherwise \end{cases}$ Find a) k b) Mean		Ĩ	
	c) p ( $14 < X < 54$ ) d) p( $X > 22$ )			
1	$u = \mu(x - 2s)$	1		

13	Find the mean and variance of the continuous random variable Y with	3	Model qp	Evaluate
	probability density function $f(x) = \int 2x - 4$ , $2 \le x \le 3$			
	probability density function $f(x) = \{0, otherwise\}$			
14	The random variable <i>X</i> is exponentially distributed with mean 3. Find $P(X > t + 3 X > t)$ where <i>t</i> is any positive real number.	3	Model qp	Evaluate
15	The joint density function of random variables X and Y is given by $f(x,y) \begin{cases} e^{-(x+y)}, x > 0, y > 0 \\ 0, & otherwise \end{cases}$	7	Model qp	Evaluate
	Find $P(X + Y \le 1)$ . Are X and Y independent? Justify			
16	A continuous random variable X is uniformly distributed with mean 1 and variance $4/3$ . Find $P(X < 0)$	7	Model qp	Evaluate
17	The IQ of an individual randomly selected from a population is a normal distribution with mean 100 and standard deviation 15. Find the probability that an individual has IQ (i) above 140 (ii) between 120 and 120	7	Model qp	Evaluate
18	(11) between 120 and 130	7	Model an	Evaluate
10	The lifetime of a certain type of electric bulb may be considered as an exponential random variable with mean 50 hours. Using central limit theorem, find the approximate probability that 100 of these electric bulbs will provide a total of more than 6000 hours of burning time.	7	KTU- June 2022	Lvaluate
19	A pair of random variables X and Y have a joint probability density function given by $f(x,y) = \begin{cases} \frac{1}{\pi}, & x^2 + y^2 \le 1\\ 0, & otherwise \end{cases}$ Show that X and Y are not independent, but uncorrelated.	8	KTU-March 2018	Understand
20	The joint pdf of two continuous random variables X and Y is $F(x,y) = \begin{cases} 8xy, 0 < y < x < 1 \\ 0, otherwise \end{cases}$ 1)Check whether X and Y are independent 2) Find p(X + Y) < 1)	8	KTU-APRIL 2018	Analyze
21	<ul> <li>A factory has two outlets to sell its products. The daily sales from the first outlet is uniformly distributed between Rs. 50,000 and 60,000 and from the second outlet is uniformly distributed between 40,000 and 60,000. The sales of the outlets are independent.</li> <li>(i)What is the probability that the total sales from both the outlets combined is more than Rs.100000.</li> <li>(ii) If 20% of the amount from the sales is profit, find the expected daily profit from both the outlets combined, and the variance of the profit.</li> </ul>	7	KTU- July 2017	Evaluate
22	The joint pdf of two continuous random variables X and Y is given by $f(x,y) = \begin{cases} kxy , 0 < x < 4, 1 < y < 5 \\ 0, & otherwise \end{cases}$ Find i) k ii) The marginal distributions of X and Y iii) Check whether X and Y are independent.	8	KTU-April 2018	Evaluate
	•			

23	The joint probability density function of a two-dimensional random variable $(X, Y)$ is given by	7	KTU- AUG2021	Apply
	$\frac{1}{x^2} = \frac{x^2}{x^2}$			
	$f(x, y) = xy^2 + \frac{1}{8}, 0 \le x \le 2, 0 \le y \le 1$			
	Compute (i) $P(X > 1)$			
	(11) $P(Y < 12)$ (iii) $P(Y < V)$			
24	(III) $P(A < I)$ The joint probability density of a two dimensional random	3	KTU- IUNE	Analyse
2-1	The joint probability density of a two-dimensional random $\left(\frac{xy}{y}\right) = 0 < x < 4, 1 < y < 5$	5	2022	1 11111 9 8 0
	variable is $f(x) = \begin{cases} \overline{96} \\ 0 \end{cases}$ , $0 < x < 4, 1 < y < 5$			
	$(0, \qquad \text{Otherwise}$ Find $P(1 < Y < 2, 2 < Y < 2)$			
25	Find $F(1 \le A \le 2, 2 \le T \le 3)$ .	7	KTU- IUNE	Apply
23	their values less than 45 and 8% are above 64. Find the mean	/	2022	лрргу
	and standard deviation of the distribution			
26		7		Apply
20	If X is a random variable with PDF $f(x) = \begin{cases} \frac{x}{3}, -1 < x < 2 \end{cases}$	2 /	2022	Аррту
	0, Otherwise			
	Find (i) Mean of X (ii) Variance of X (iii) Cdf of X.			
	MODULE 3			
1	A Sample of 20 items has mean 42 and SD 5.Test whether the	7	KTU JULY	Analyse
	sample us from a population with mean 45 (5% level of		2021	
	significance)			TT 1 / 1
2	The mean life time of certain products is 1800 hours with SD of 100 hours. But any lating a manufacture is the plained that the	of 7	2021	Understand
	100 nrs. By applying a new technique, it is claimed that the		2021	
	products were taken and it is found that the mean life time is			
	1850 hrs. Can we support the claim at 1% level of significance	?		
3	In a university 325 out of 600 students are boys. Does this	7	KTU JULY	Understand
	information support the conclusion that majority of students in	l I	2021	
	this university are boys ?(Use 5% level of significance)			
4	Random samples drawn from two countries gave the following	g 7	KTU JULY	Analyse
	data relating to height of adult males.		2021	
	Country A Country B			
	Mean Height 67.42 67.25			
	Standard Deviation 2.58 2.5			
	Number in Samples10001200			
	Is the difference between the means significant?(5% level of			
_	Significance )			A
2	The proportion of a characteristic of a population is $p = 0.37$ .	3	2021	Арріу
	from a sample of size 100			
6	A Sample of size 49 is taken with mean 35 and standard	3	KTU JULY	Evaluate
	deviation 11 from a population .Find the 99% confidence	5	2021	
	interval for the population mean.			
7	The mean blood pressure of 100 randomly selected person from	m 7	Model	Apply
	a target population is 127.3 units .Find a 95% confidence		Question	
	interval for the mean blood pressure of the population .			

8	The Cl	EO of a large	electric utili	ty claims that	t 80 percent of his	7	Model	Apply
	1,000,000 customers are very satisfied with the services they						Question	
	receive. To test this claim, the local newspaper surveyed 100							
	custon	ners, using sin	mple random	mong the sampled				
	custon	ners,73 perce	ent say they a	are very satisf	fied .Based on			
	these f	ïndings, do y	ou think that	t the CEO is r	naking a false			
	claim o	of high satisfa	action level a	among his cu	stomers ?Use a			
	0.05 le	evel of signifi	cance.					
9	Two ty	pes of cars a	re compared	for accelerat	ion rate 40 test	7	Model	Analyse
	runs ar	re recorded for	or each car ai	nd the result f	for the mean		Question	
	elapsed	d time record	ed below:	1				
		Simple Mean	Sample standa	ard Deviation				
	Car A	7.4	1	.5				
	Car B	7.1	1	.8				
	Detern	nine if there i	s a differenc	e in the mean	elapsed times of			
	the two	o cars at 95%	confidence	level.	-			
10	The 95	5% confidenc	e interval fo	or the mean m	ass (in grams ) of	3	Model	understand
	tablets	produced by	a machine is	s [0.56 ,0.57]	, as calculated		Question	
	from a	random sam	ple of 50 tab	lets .What do	you understand			
	from tl	his statement						
11	A com	pany manufa	cturing tyres	claims that i	ts deluxe tyre	7	KTU-JUNE	Evaluate
	averag	es at least 50	000 miles be	fore it needs	to be replaced.		2022	
	From t	the past studie	es of this tyre	e, the standar	d deviation is			
	known	to be 8000.	A survey of o	owners of the	e tyre design is			
	conduc	cted. From th	e 38 tyres su	rveyed, the n	nean lifespan was			
	46500	miles. Using	the level of	significance	1% test the claim			
10	of the company.						KTU UNE	Analysa
12	moon k	anulacturer o	or a certain ty	vire is more the	vire claims that the	/	2022	Anaryse
	sample	of 6 metal ti	ires give the	mean of $573$	with a variance of			
	sample of o metal tires give the mean of $5/3$ with a variance of $14$ . Test whether the manufacturer's claim can be accepted at							
	5% level of significance							
13	A shor	okeeper claim	is that at mos	st 60% of cus	tomers entering	7	KTU-JUNE	Evaluate
10	the sho	op leaves with	hout making	a purchase. C	Dut of a random		2022	
	sample	e of 50 custor	ners, 35 four	nd to left with	out making a			
	purcha	se. Does this	data support	t the claim of	the shopkeeper at			
	5% lev	vel of signific	ance?					
14	From t	the given data	a test at 5% l	evel of signif	icance whether	7	KTU-JUNE	Analyse
	there is	s any signific	ance differen	nce between r	means of A and B.		2022	
	Samp	ole Sa	mple size	Mean	SD			
	А	64	-5	7.90	0.47			
	B	45	0	7.88	0.42			
	** *			MOD	OULE 4	-		<b>F</b> .1 .
1	Using I	Newton-Raphs	son method, co	ompute a real 1	root of		KIU-APRIL	Evaluate
	<i>e</i> <sup>2</sup> ~ ·	-x - 6 = 0	ying between	U and I.			2010	
2	Using I	Lagrange's int	erpolation me	thod find the p	polynomial $f(x)$	5	KTU- MAY	Evaluate
	which a	agree with the	data $f(-1)$ =	= 3, f(0) = -	-4, f(1) = 5 and		2017	
	J(2) =	-b						

3	The speed of a moving particle was measured at different points of time. The time t when the first measurement was recorded is taken as $t = 0$ . Subsequent speeds at different times are as shown in the following table		KTU-APRIL 2018	Understand
	Time(t) in seconds       0       10       20       30       40       50       60         Velocity (v) in m/sec $35$ $39$ $44$ $50$ $56$ $43$ $40$			
	Using Simpson's one-third method, evaluate the distance travelled by the particle in 60 seconds	-		
4	Health surveys are conducted in a city every 10 years. The following data gives the number of people (in thousands) having heart diseases	10	KTU-MAY 2017	Apply
	as found from the records of the survey           Year         1961         1971         1981         1991         2001         2011           Number of the survey         10         22         22         24         11			
	No. of people         16         19         23         28         34         41			
	Use Newton's interpolation method to estimate the number of people with heart diseases in the year 2005			
5	Using Newton Raphson method to solve the equation $x^3+x-1=0$ correct to 4 decimal places	6	KTU-May 2017	Apply
6	Evaluate $\oint_0^6 \frac{1}{1+x^2} dx$ using (1) Trapezoidal rule (2) Simpson's rule	7	KTU-MAY 2017	Apply
7	with 6 equal intervals. Using Newton's forward interpolation formula estimate sin52 given	7	KTU-MAY	Apply
	$\theta$ : 4550556065 $\sin\theta$ :0.70710.76600.81920.86600.9036	-	2017	
8	Use Newton-Raphson method to find a non-zero solution of $x = 2 \sin x$ . Start with $x_0 = 1$	7	Model qp	Evaluate
9	Evaluate $\int e^{\frac{-x^2}{2}} dx$ using Simpson's one-third rule, dividing the	7	Model qp	Evaluate
	interval [0, 1] into 8 subintervals			
10	Using Lagrange's interpolating polynomial estimate $f(1.5)$ fothe following data	7	Model qp	Evaluate
	x 0 1 2 33			
11	y = f(x) 0 0.9826 0.6299 0.5532	7	Model an	Evoluoto
11	Consider the data given in the following table $x$ 00.511.522	/	would up	Evaluate
	f(x) 1.0000 1.0513 1.1052 1.1618 1.2214			
	Estimate the value of $f(1.80)$ using newton's backward interpolation formula.			
12	Find all the first and second order forward and backward differences of <i>y</i> for the following set of $(x, y)$ values: $(0.5, 1.13)$ , $(0.6, 1.19)$ , $(0.7, 1.26)$ , $(0.8, 1.34)$	3	Model qp	Evaluate
13	The following table gives the values of a function $f(x)$ for certain	3	Model qp	Evaluate
	values of x. $x$ 0         0.25         0.50         0.75         1			
	$f(x) \ 1 \ 0.9412 \ 0.8 \ 0.64 \ 0.5$			

	Evaluate $f(x)dx$ using trapezoidal rule.			
14	Use Newton's forward difference formula to find y at $x = 1.5$ . X       0       1       2       3       4         Y       7       10       12       32       12	7	KTU- AUG2021	Evaluate
15	y710132243Find a positive root that lies between 0 and 1 of $3x=1+cosx$ using Newton Raphson's method correct to 4 decimal places		KTU- AUG2021	Apply
16	Given $f(0) = 1$ , $f(1) = 3$ , $f(3) = 55$ . Use Lagrange's Interpolation method to find $f(2)$ .		KTU- AUG2021	Apply
17	Using regula falsi method compute the real root of the equation $e^{2x} - x - 6 = 0$ correct to 4 decimal places.	7	KTU - JUNE 2022	Apply
18	Calculate y(0.015) using Newton's forward interpolationformula.x0.010.020.030.040.05122245	7	KTU - JUNE 2022	Evaluate
19	y       1.2       2.5       3.6       4.6       5.3         Evaluate $\int_{1}^{2} \frac{dx}{x}$ using Simpson's $\frac{1}{3}$ rule. (Take $h = 0.25$ )	7	KTU - JUNE 2022	Evaluate
20	The following table gives the values of $\cos \theta$ where $\theta$ is in degrees. Using Newton's backward interpolation formula estimate the value of $\cos 5$ 3°. $\theta$ 102030405060 $\cos \theta$ 0.9840.90.8660.7660.6420.58397008000	7	KTU - JUNE 2022	Apply
21	Solve $x^3 = 25$ by Newton-Raphson method correct to 3 decimal places.	3	KTU - JUNE 2022	Evaluate
22	23% of people used a particular brand of tea. After providing a special offer 312 out of 1200 randomly selected people found to be consumers of the brand. State the null hypothesis and alternative hypothesis to test whether the data provide sufficient evidence to conclude that there is an increase in the proportion of people using the brand after providing the offer.	3	KTU - JUNE 2022	Analyse
	MODULE-5			
1	Using Runge-Kutta method of order four, compute y(0.2) given that $,\frac{dy}{dx} = e^x + y, y(0) = 0.$ Take step size $h = 0.1$	8	KTU-MAY 2017	APPLY
2	Use Euler Method with h = 0.1 to find y at x = 0.3 for the equation $\frac{dy}{dx} = \frac{y}{1+x},  y(0) = 2$	6	KTU- May 2017	Apply
3	Apply Runge-Kutta Method of order 4, find an approximate value of y when $x = 0.7$ given $\frac{dy}{dx}y - x^2$ and $y(0.6) = 1.7379$ .	7	KTU-APRIL 2018	Apply
4	Use Runge Kutta method of order 4 to find $y(0.2)$ for the differential equation $y1 = 3x + 0.5 y$ , $y(0) = 1$ (Take $h = 0.2$ )	7	KTU-MAY 2019	Apply
5	Given the initial value problem $y_i = y + x$ , $y(0) = 0$ , find $y(0.1)$ and $y(0.2)$ using Euler method	3	Model qp	Evaluate
6	Explain the principle of least squares for determining a line of best fit to a given data	3	Model qp	Evaluate

7	Using Gauss-Seidel method, solve the following system of equations	7	Model qp	Evaluate
	20x + y - 2z = 17			
	3x + 20y - z = -18			
8	2x - 3y + 20z = 25	7	Model ap	Evaluate
Ū	The table below gives the estimated population of a country (in	,	IF	
	millions) for during 1980-1995			
	year 1980 1985 1990 1995			
	$\frac{1}{227} = \frac{1}{237} = \frac{1}{249} = \frac{1}{202}$			
	the method of least squares. Hence predict the population for the			
	year 2010.			
9	Use Runge-Kutta method of fourth order to find $y(0.2)$ given the	7	Model qp	Evaluate
	initial value problem. $\frac{dy}{dx} = xy1 + x^2 y(0) = 1$ . Take step-size,			
10	h = 0.1.	7	M. 1.1	T al ata
10	Solve the initial value problem	/	model qp	Evaluate
	$\frac{dy}{dx} = x + y$ , $y(0) = 0$ , $0 \le x < 1$ , taking step-size $h = 0.2$ .			
	Calculate $y(0.2), y(0.4)$ and $y(0.6)$ using Runge-Kutta			
	second order method, and $y(0.8)$ and $y(1.0)$ using Adam-			
11	Moulton predictor- corrector method.		KTU-	Apply
11	Use Runge-kutta method to find $y(0.2)$ for the equation		AUG2021	1 PP-J
	$\frac{dy}{dx} = y - xy + x$ , $y(0) = 1$ take $h = 0.2$			
12	Find the approximate value of $0464 - x^2$ dx by Trapezoidal		KTU-	Evaluate
	rule (using $h = 0.5$ )		A002021	
13	Using Gauss-Seidal iteration method, find an approximate	7	KTU- JUNE 2022	Apply
	solution to the following system of equations correct to 4		2022	
	decimal places.			
	8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z			
14	-30	7	KTU- JUNE	Apply
	Use Runge-Kutta method of order 4 to find $y(0.7)$ if $\frac{dy}{dx} =$		2022	
1.7	$y - x^2$ given $y(0.6) = 1.737$ . (Choose $h = 0.1$ )	7		A
15	Fit a second degree parabola of the form $y = a + bx + cx^2$	/	2022	Anaryse
	to the following data.			
	x 0 1 2 3 4			
	y 1.2 1.7 2.1 2.8 5.9			
16	Solve $\frac{dy}{dy} = r^2(1 + y)$ for $r = 1.4$ using Adams Moulton	7	KTU- JUNE	Apply
	Method given $y(1) = 1$ $y(11) = 1.222$ $y(12) =$		2022	
	1.548 and $v(1.3) = 1.979$ .			
17	Write the normal equations for fitting the curve $y = a + hr^2$	3	KTU- JUNE	Understand
10	while the normal equations for fitting the curve $y = u + bx$	2	2022 KTU UNE	Apply
10	Use Euler's method with $h = 0.2$ , to find $y(0.2)$ if $\frac{dy}{dx} = y + y$	3	2022	ահհւն
	$e^x \cos x ,  y(0) = 0$			

CODE:	COURSE NAME:		Creadity 4
ME I 206	FLUID MACHINERY Modulo I	Month & Voor	Creatt: 4
Q.No	Show that the angle of swing of a vertical binged plate when a jet of water strike at its	Month & Year	Marks
1	centre is given by $Sin\theta = \frac{\rho A V^2}{w}$	July 2021	3 Marks
2	Show that the force exerted by a jet of water on a inclined fixed plate in the direction of jet is given by $F_x = \rho A V^2 Sin^2 \theta$	July 2021	3 Marks
3	Sketch the velocity triangles for the inlet and outlet of the buckets of a Pelton turbine and label all the salient velocities and angles.	July 2021	3 Marks
	A 6.0 cm diameter free jet of water having a velocity of 10 m/s impinges on a		
4	plane, smooth plate at angle of 30° to the normal to the plate. (a) What will be the force due to jet impingement on the plate and work done per second when the plate is (i) stationary and (ii) moving in the direction of the liet at 5.0 m/s velocity?(b) What will be the force due to jet on the plate when the plate	July 2021	5 Marks
	is moving against the jet direction at 5.0 m/s velocity?		
	A reaction turbine works under a head of 115 m and its speed is 450 rpm. The		
5	absolute and the relative velocities make angles of 20° and 60° respectively	July 2021	9 Marks
	with the tangential velocity. Determine the power developed and the hydraulic	5	
	efficiency. Assume the velocity of whirl at the outlet is zero.		
6	ratio is 1.61. If this turbine produces 6.5 MW of power at a head of 15 m under a speed of 150 rpm, calculate (a) the specific speed, (b) discharge, and (c) flow ratio. Assume overall efficiency as 92%.	July 2021	7 Marks
	A Pelton wheel has two jets and is designed to produce a power of 7500 kW		
	with a net head of 400 m. The buckets deflect the jet by an angle of 165°. The reduction of the relative velocity due to friction in the buckets can be taken as		
	15%. Calculate		
7	(a) total discharge through the turbine,	July 2021	7 Marks
	(b) diameter of each jet (c) the total force exerted by the jets on the wheel in the tangential direction.		
	Assume overall efficiency = $80\%$ , coefficient of velocity = $0.98$ , and speed		
	ratio = $0.47$ .		
8	plate in the direction of jet.	June 2021	3 marks
9	Differentiate between inward flow and outward flow reaction turbines	June 2021	3 marks
10	Find an expression for the efficiency of a series of moving curved vanes when a	L., . 2021	7 Maulas
10	when u=V and value of maximum efficiency is 50%	June 2021	/ Marks
11	A square plate weighing 115N and uniform thickness and 30cm edge is hung so that horizontal jet 2cm diameter and having velocity of 15 m/sec impinges on the plate. The centre line of jet is 15cm below the upper edge of the plate, and when the plate is vertical the jet strikes the plate normally and at its centre. Find the force must be applied at the lower edge of the plate in order to keep the plate vertical. If the plate is allowed to swing freely, find the inclination to the vertical which the plate will assume under the action of jet.	June 2021	7 Marks
12	A Pelton wheel has a bucket speed of 35m/sec with a jet of water flowing at the rate of 1m3/sec under a head of 270m. The bucket deflected the jet through an angle of 170 o. Calculate the power delivered to the runner and the hydraulic	June 2021	7 Marks
	efficiency of the runner. Assume coefficient of velocity as 0.98		
13	with neat sketches.	June 2021	7 Marks
14	Find an expression for the efficiency of a series of moving curved vanes when a jet of water strikes the vanes at one of its tips and show that the maximum	May 2019	3 Marks
15	(i) Find the force exerted by the jet on a stationary vertical plate	May 2019	3 Marks
16	find the force exerted by a jet of water of diameter 75mm on a stationary flat	May 2010	3 Marka
10	plat, when the jet strikes the plate normally with velocity of 20m/s.	wiay 2019	JIVIAIKS
17	A Pelton wheel is to be designed for a head of 60m when running at 200r.p.m. The Pelton wheel develops 95.6475kw shaft power. The velocity of the buckets	May 2019	3 Marks
	is 0.45 times the velocity of the jet, overall efficiency is 0.85 and co-efficient of the velocity is equal to $0.98$		2 marks
	Define the following terms of Turbine:		
	(i) Gross head		
18	(ii) Net head	May 2019	4 Marks
	(iv)Mechanical efficiency		
Q.No	Module II	Month & Year	Marks

1	Explain the terms manometric efficiency, mechanical efficiency and overall efficiency	July 2021	3 Marks
1	as applied to centrifugal pumps	July 2021	JIVIAIKS
	a) Distinguish between:		
2	(a) Semi-scroll case and full-scroll case	July 2021	5 marks
	(b) Guide vanes and stay vanes	<u> </u>	-
	(c) Net head and Euler head		
	A centrifugal pump with 40 cm impeller diameter delivers /5 L/s of oil of relative density 0.85 at a tin speed of 25.1 m/s. The flow velocity is constant at		
	2.0  m/s and the outlet blade is curved backwards at an angle of 350. The overall		
3	efficiency is 0.88.	July 2021	9 Marks
	(a) Calculate the brake power and torque applied to the pump shaft.		
	(b) If the inlet diameter is 25 cm, calculate the inlet-blade angle		
4	a) Derive an expression for the minimum speed for starting a centrifugal pump	July 2021	5 marks
	b)A centrifugal pump impeller is 40 cm in outer diameter and 2.5 cm wide at the exit.		
	Its blade angle at the outlet is 300. When run at a speed of 1500 rpm, the		
5	flow rate through the pump is 80 liters/s. (a) Calculate the radial, relative and	July 2021	9 Marks
	absolute velocities at the impeller exit. (b) If there is no inlet whirl, what would		
(	be the theoretical head added to the water by the impeller?	Law - 2021	2 Maular
0	Differentiate between pumps and outward turbines	June 2021	3 Marks
/	Define the terms : suction head, delivery head and manometric head	June 2021	3 Marks
0	With a net sketch explain the working of Governing system of a Pelton Turbine	June 2021	/ Warks
0	A turbine operate under a nead of 30m at 500rpm. The discharge is 10 m5/sec. The	June 2021	7 Marks
,	generated and type of the turbine	June 2021	/ Wiarks
	A centrifugal pump having outer diameter equal to two times the inner diameter		
	and running at 1200 rpm works under total head of 32m. The velocity of flow		
10	through the impeller is constant and equal to 3m/sec. The vanes are set back at an	June 2021	7 Martia
10	angle of 300 at the outlet. If the outer diameter of the impeller is 600mm and	June 2021	/ Marks
	width at outlet is 50mm, determine (i) vane angle at inlet (ii) work done per sec		
	by the impeller (iii) manometric efficiency.		
11	Derive an expression for the minimum starting speed of a centrifugal pump.	June 2021	7 Marks
12	What is the function of draft tube? With neat sketch explain draft tube theory	May 2021	4 Marks
	A turbine is operating under a head of 25m at 200r.p.m. The discharge is 9m <sup>3</sup> /s.		
12	(i) Power generated	May 2021	6 Marks
15	(ii) Specific speed of the turbine and	Wiay 2021	0 Walks
	(iii) Type of turbine		
14	(i) what is the significance of Type number in Turbines	14 2021	
14	(ii) Define specific speed of a turbine. Derive an expression for the same.	May 2021	4 Marks
	The diameter of an impeller of a centrifugal pump at inlet and outlet are 30cm		
15	and 60cm respectively. Determine the minimum starting speed of the pump if it	May 2021	4 Marks
	works against a head of 30cm.		
16	With neat sketch explain the performance characteristic curves of a centrifugal	May 2021	6 Marks
	pump Define the following terms of contrifued numn		
	(i) Suction head		
17	(ii) Delivery head	May 2021	4 Marks
	(iii)Static head		
	(iv)Manometric head.		
Q.No	Module III	Month & Year	Marks
1	What is an air vessel? Describe the function of the air vessel for reciprocating pumps	July 2021	3 Marks
2	Explain the term negative slip of a reciprocating pump. Why and when negative slip	July 2021	3 Marks
	OCCURS /		
2	a) Considering the effect of acceleration and inction in suction and delivery pipes,	July 2021	10 Marks
5	starting from the fundamentals derive an expression for work done per second	July 2021	10 Iviaiks
	b) A single-acting reciprocating pump has a 15 cm diameter niston with a crank of		
	15 cm radius. The delivery pipe is of 10 cm diameter. At a speed of 60 rpm, a		
4	discharge of 310 litres/minute of water is lifted to a total height of 15 m. Find	July 2021	4 Marks
	the slip, coefficient of discharge and theoretical power in kW required to drive		
	the pump		
	a) A single-acting reciprocating pump has a stroke length of 15 cm. The suction		
	pipe is / m long. The water level in the sump is 2.5 m below the cylinder. The		
5	speed of the nump is 75 rpm determine the pressure head on the piston at the	July 2021	9 Marks
	(a) beginning, (b) middle, and (c) end of the suction stroke. Take Darcy–		
	Weisbach friction factor $f = 0.02$ .		

6	b) With a neat sketch, explain the working of any one rotary displacement pump.	July 2021	5 Marks
	Give two applications of this pump.	1	236.1
7	Define slip, percentage slip and negative slip of a reciprocating pump	June 2021	3 Marks
8	What is a hydraulic intensifier? Explain its principle and working	June 2021	3 Marks
9	Draw an indicator diagram, considering the effect of acceleration and friction in suction and delivery pipes. Find the expression for work done per second in the case of single acting reciprocating pump.	June 2021	7 Marks
10	A double acting reciprocating pump, having cylinder diameter 15 cm and stroke length 30 cm is used raise the water through a height of 30 meters. If the pump is working at 30rpm and the pump efficiency is 73%, what power is required to drive the pump?	June 2021	7 Marks
11	Explain with neat sketch, the principle and working of the following hydraulic devices i)hydraulic ram, ii) Accumulator iii) Intensifier	June 2021	7 Marks
12	Explain with neat sketch, the working of jet pump, vane pump and lobe pump	June 2021	7 Marks
13	<ul><li>i) Define ideal indicator diagram.</li><li>ii) Show that area of indicator diagram is proportional to the work done by the</li></ul>	May 2021	6 Marks
	reciprocating pump		
14	<ul> <li>A single acting reciprocating pump, running at 50 r.p.m delivers 0.01m<sup>3</sup>/s of water. The diameter of the piston is 200mm and stroke length 400mm. determine:</li> <li>i) The theoretical discharge of the pump.</li> <li>ii) Co-efficient of discharge</li> <li>iii) Slip and percentage slip of the pump</li> </ul>	May 2021	6 Marks
15	Show from first principle that work saved against friction in the delivery pipe of	May 2021	4 Marks
	a double – acting reciprocating pump, by fitting air vessel is 39.2%.	1111 2021	
Q.No	Module IV	Month & Year	Marks
1	Explain the advantages of multistage compression of air.	July 2021	3 Marks
2	Compare reciprocating compressor with a rotary compressor.	July 2021	3 Marks
3	a) Derive an expression for the work done in a reciprocating compressor with and without clearance volume	July 2021	7 Marks
4	minute at 1 bar and 17°C and delivers it at 7 bar. The compressor tacks in 7 m5 an per minute at 1 bar and 17°C and delivers it at 7 bar. The compressor runs at 300 rpm and follows the law pV1.35 = constant. Calculate the cylinder bore and stroke required, assuming stroke-to-bore ratio of 1.5. Calculate the power of the motor required to drive the compressor, if the mechanical efficiency of the compressor is 85% and that of motor transmissions is 90 %. Neglect clearance volume and take $\mathbf{R} = 0.287 \text{ k/kg/k}$ for air	July 2021	7 Marks
5	a) With a neat sketch, explain the principle of operation, construction and working of centrifugal compressor. Explain 'Surging' in centrifugal compressor	July 2021	10 Marks
6	b) Define the term 'Free Air Delivered(F.A.D)'. Why free air delivered is less than the displacement of the compressor	July 2021	4 Marks
7	Compare reciprocating and rotary air compressors	June 2021	3 Marks
8	Explain surging and choking in centrifugal compressors	June 2021	3 Marks
9	A single stage single acting compressor has a delivers 0.6kg of air per minute at 6 bar. The temperature and pressure at the end of suction stroke are 30 oC and 1bar. The bore and stroke length of the compressor are 100mm and 150mm respectively. The clearance is 3% of the stroke volume. Assume n =1.3. Find (i) volumetric efficiency of the compressor ii) power required to drive the compressor if mechanical efficiency 85% and speed of the compressor	June 2021	7 Marks
10	Derive the expression of degree of reaction of an axial flow air compressor in terms of blade angles and blade velocity.	June 2021	7 Marks
11	An axial flow compressor having eight stages and with 50% reaction design compresses air in the pressure ratio of 4:1. The air enters the compressor at 200 C and flows through it with a constant speed of 90m/s. The rotating blades of compressor rotates with a mean speed of 180m/s, isentropic efficiency of the compressor may be taken as 82%. Calculate work done by the machine and Blade angles	June 2021	
12	Explain the working of (i) vane compressor and (ii) screw compressor	June 2021	7 Marks
13	A single acting, single cylinder reciprocating air compressor has a cylinder diameter of 200mm and a stroke of 300mm. Air enters the cylinder at 1bar, 27°C. It is then compressed polytropically to 8 bar according to the law = Constant. If the speed of the compressor is 250rpm, calculate (i) the mass of air compressed per minute and (ii) the power required in KW for driving the compressor, if mechanical efficiency is 80%. Neglect clearance.	May 2021	5 Marks
14	Prove that the work done per Kg of air in a compressor is given by $\mathbb{W} \mathbb{R}T_{\frac{n}{n+1}}[(r_p)^{\frac{n}{n+1}} \cdot 1]$		5 Marks
1			

	A single stage regimeroceting air compressor is compressing 2kg of air per minute		
15	A single stage recipiocating an compressor is compressing $2 \text{ kg}$ of an per limit defined at 1 bar $20^{\circ}$ C and it delivers it at 7 bar. Assuming compression process follows		
	the law $\mathbb{R}^{1}$ Constant Calculate indicated power input to compressor neglect	May 2021	5 Marks
	clearance		
	Prove that for complete inter - cooling between two stages the compression work		
16	would be minimum when intermediate pressure = $p_i = \sqrt{p_i \times p_i}$	May 2021	5 Marks
17	State how are the air compressors classified?	May 2021	4 Marks
17	Describe with a neat sketch the construction and working of a single-stage	1111 2021	Thumb
18	single-acting reciprocating air compressor?	May 2021	6 Marks
19	With neat sketch explain surging and chocking	May 2021	4 Marks
20	Explain the methods to improve the isothermal efficiency of an air compressor	May 2021	5 Marks
	Air at a temperature of 3050K flows in a centrifugal compressor running at	1114) 2021	0 111111
	16000 rpm. Isentropic efficiency of the compressor is 80%. Outer diameter of the		
21	blade tip is 600mm. Take slip factor as 0.85. Calculate	May 2021	6 Marks
	(i) The temperature rise of air passing through the compressor	j	
	(ii) The static pressure ratio		
22	Derive the expression for width of impeller blade for centrifugal compressor	May 2021	4 Marks
23	With neat sketch explain the construction and working of a vane compressor	May 2021	4 Marks
	Discuss the merits and demerits of a centrifugal compressor over axial flow		
24	compressor	May 2021	6 Marks
Q.No	MODULE V	Month & Year	Marks
1	Describe with neat schematic and T-s diagrams, the working of a simple constant	L 1 2021	234 1
1	pressure combustion gas turbine cycle.	July 2021	3 Marks
2	State the assumptions made in an ideal cycle analysis of gas turbines.	July 2021	3 Marks
	a) A gas turbine unit has a pressure ratio of 6 and maximum cycle temperature of	•	
	610 Degree C. The isentropic efficiency of the turbine and compressor are 0.82 and 0.8		
2	respectively. Calculate the power output in kW of an electric generator, geared	July 2021	0 Marks
5	to the turbine when the air enters the compressor at 15 degree C at a rate of 16 kg/s.	July 2021	9 Marks
	Take Cp=1.005 kJ/kg.K and $\gamma$ =1.4 for compression process and Cp=1.11		
	kJ/kg.K and $\gamma$ =1.333 for expansion process		
4	b) Write the merits and demerits of gas turbine plant over internal combustion	July 2021	5 Marks
	engines	5 aly 2021	
5	a) Differentiate between open, closed and semi closed gas turbine cycles.	July 2021	5 Marks
6	b) Draw a neat sketch and T-s diagram of a regenerative gas turbine plant and	July 2021	9 Marks
	deduce an expression for its thermal efficiency.	0419 2021	,
7	What do you mean by the term Gas Turbine? How are Gas Turbines classified?	June 2021	3 Marks
8	Describe with sketches the working of simple constant Pressure Gas Turbine.	June 2021	3 Marks
	The gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature		
	of 610 0C. The isoentropic efficiencies of compressor and turbine are 80% and		
9	82% respectively. Calculate the power output in kilowatts of an electric generator	June 2021	7 Marks
-	geared to the turbine when the air enters the compressor at 150C at the rate of		
	16kg/s. Assume cp= 1.005kJ/kgK and $\gamma$ =1.4 for the compression process, and		
	take cp= 1.11kJ/kgK and $\gamma = 1.3333$ for the expansion process.		
10	Explain the different methods employed to increase the specific output and	June 2021	7 Marks
	Eind the service daily for the first sector to this and service and service and service daily for the first sector to the sector		
	afficiencies are 85% and 80% recreatively. Maximum evals temperature in		
	Endended are $0.570$ and $0.070$ respectively. Maximum cycle temperature is 8750C. The working fluid can be taken as sig ( $n=1kI/kgK$ , $n=1.4$ ) which enters		
11	the compressor at 1 har and 27 of The pressure ratio is 4. The fuel used has	June 2021	7 Marks
	calorific value of $42000$ kI/kg. There is a loss of 10% of calorific value in the		
	combustion chamber.		
	Briefly explain the various fuels used in Gas turbine and list the application of		
12	Gas Turbines	June 2021	7 Marks

CODE:	COURSE NAME:		Credi
NIE 1 20 2	ENGINEERING THERMODYNAMICS		t:
Q.No	Module I	Month & Year	Marks
1	List any 6 applications of thermodynamics	Dec 2017	3
2	Explain thermodynamic equilibrium	June 2022	3
3	Distinguish between thermodynamic system and control volume	June 2022	3
4	Explain microscopic and macroscopic viewpoints	May 2019	3
5	How does the state function vary from path functions with one example each?	April2018	3
6	Distinguish between State, path and process	Do	3
7	How will you define density and pressure using the concept of continuum	Do	3
8	Define property of a system with two examples. Why thermodynamic properties are taken as coordinates in thermodynamics	Dec 2017	3
9	How the Zeroth law of Thermodynamics forms the basis for the measurement of	April 2018	3
10	temperature?	Sept 2020	3
11	How does resistance thermometer measure temperature	December 2018	3
12	What are intensive and extensive properties	Sept 2020	3
13	What is a thermocouple? What is its engineering applications	Sept 2020	3
14	Define thermometric property. Why is a gas chosen as standard thermometric substance	July 2017	3
15	Explain temperature scale? How can the ideal gas temperature for the steam point be measured	July 2017	3
16	Explain free expansion. Why displacement work is absent in free expansion	Dec 2017	3
17	Write short notes on i) Different forms of energy ii) System, boundary ,surroundings,iii) Point and path function	Jan 2017	3
18	What is a quasi-static process? Is it a reversible process? How?	April2018	3
19	What is a quasi static process with neat sketches. What are its characteristics	June2022, Dec2019	3
	Module II		
	Describe a few situations in which forms of work other than displacement or pdv work appear in systems.		3
2	What is the total energy of a system? Prove that total energy is a thermodynamic property of a system.		4
3	<ul><li>a)What is PMM1? Why is it not possible? (3)</li><li>b) Define enthalpy. Prove that for ideal gas enthalpy is a function</li></ul>	Dec 2017	3
	of temperature alone.		3

4	Obtain the mass balance and energy balance equations for a variable flow process.	Nov 2020	5
5	How the First Law of Thermodynamics is applied to a process? Show how this formulation changes when it completes a thermodynamic cycle.	April 2018	6
6	1 kg of air at 4 bar and 150°C is contained in a system. It is expanded by a reversible process till the pressure falls to 1.01325 bar. The gas is then heated at a constant pressure process until the heat content is increased by 72.5 kJ. Calculate: i) The work done ii) The pressure and temperature at the end of the constant pressure process iii) The index of expansion, if the above processes are replaced by a single reversible polytropic process giving the same work between the same initial and final states. Take Cp = 1 kJ/kg K, Cv = 0.714 kJ/kg K.	2018 April	4
7	a) Derive steady flow energy equation.	Dec 2017	5
	b) In an adiabatic gas turbine, air expands at $1200$ kPa and $500^{\circ}$ C to $100$ kPa and $150^{\circ}$ C. Air enters the turbine with a velocity of 40m/s through an opening of area 0.2m <sub>2</sub> and exhausts through a 1m <sub>2</sub> opening. Determine (a) mass flow rate of air through the turbine and (b) the power produced by the turbine.		5
8	A rigid tank of 2m <sup>3</sup> initially contains air at 100kPa and 25° C. The tank is connected to a supply line which contains air at 600kPa and 25°C through a valve. The valve is opened and air is allowed to enter the tank until the pressure in the tank reaches the line pressure at which the valve is closed and the temperature of the air inside the tank at this instant measures 80°C. Determine (a) the mass of air that has entered the tank and (b) the amount of heat transfer.	Dec 2017	6
9	If a gas of volume $6000 \text{cm}^3$ and at a pressure of 100KPa is compressed quasi statically according to $pV^2$ =constant until volume becomes 2000 cm <sup>3</sup> , determine the final pressure and work transfer.	Nov 2020	4
10	A fluid undergoes a reversible adiabatic compression from 0.5MPa, 0.2m3 to 0.05m3 according to the law, $pv1.3 = constant$ . Determine the change in enthalpy, internal energy and entropy, and the heat transfer and work transfer during the process	Jan 2017	4
11	<ul> <li>a) Which property of a system increases when heat is transferred: (a) at constant volume (b) at constant pressure (4)</li> <li>b) A mass of 8kg gas expands within a flexible container so that the p-v relationship is of the form pv1.2=constant. The initial pressure is 1000kPa and the initial volume is 1m3. The final pressure is 5 kPa. If specific internal energy of the gas decreases by 40kJ/kg, find the heat transfer in magnitude and direction.</li> </ul>	Dec 2018	6
1		1	1

1	aEstablish the equivalence of Kelvin-Plank and Clausius statements. (4) b) A heat pump working on the Carnot cycle takes in heat from a reservoir at 5°C and delivers heat to a reservoir at 60°C. The heat pump is driven by a reversible heat engine which takes in heat from a reservoir at 840°C and rejects heat to a reservoir at 60°C. The reversible heat engine also drives a machine that absorbs 30kW. If the heat pump extracts 17kJ/s from 5°C reservoir. Determine (a) rate of heat supply from the 840°C source and (b) the rate of heat rejection to the 60°C sink. (6)	2017 July	6
2	a) Establish the Inequality of Clausius? (4) b) Two kg of air at 500 kPa, 80°C expands adiabatically in a closed System until its volume is doubled and its temperature becomes equal to that of the surroundings which is at 100 kPa, 5°C. For this process, determine (a) the maximum work, (b) the change in availability and (c) the irreversibility. For air, take cv = 0.718 kJ/Kg K, u = cvT where cv is constant, and pV = mRT where p is pressure in kPa, V volume in m3, m mass in kg, R a constant equal to 0.287 kJ/kg K, and T temperature in K. (6)	2017 July	6
3	<ul> <li>a) Compare the COP of a heat pump to that of a refrigerator. What is the reason for their difference? (4)</li> <li>b) Explain the internal and external irreversibility with practical examples. (6)</li> </ul>	2018 April	4 6
4	<ul> <li>a) Explain the working of a Carnot cycle using P-v and T-s diagrams. State why a Carnot engine can't be realized? (6)</li> <li>b) An inventor claims that he developed a refrigerator for removing a heat of 1440 kJ/min from a temperature of 0°C to 25°C by receiving an external work of 2 kW. Comment on his claim.</li> </ul>	2018 Apri	6 4
5	Explain the two statements of the Second law of thermodynamics. Why PMM2 is impossible (5) b) A heat engine operating between two reservoirs at temperatures $600^{\circ}$ C and $40^{\circ}$ C drives a refrigerator operating between reservoirs at temperatures of $40^{\circ}$ C and $-15^{\circ}$ C. The heat transfer to the heat engine is 2500kJ and the net work output of the combined engine and refrigerator plant is 400kJ. The efficiency of the heat engine and COP of the refrigerator are each $40^{\circ}$ of the maximum possible values. Estimate the heat transfer to the refrigerator and pet heat transfer to the refrigerator and pet heat transfer to the refrigerator operation.	2018 Dec	5
6	<ul> <li>a) State and prove Clausius theorem (5)</li> <li>b) Determine the maximum work obtainable by using one finite body at temperature T and a thermal energy reservoir at temperature T0, T&gt;T0 (5)</li> </ul>	2018 Dec	5 5
7	Derive expression for useful work for a steady flow system which interacts only with the surroundings. (5) b) Calculate the decrease in exergy when 25 kg of water at 95oC mix with 35 kg of water at 35oC, the pressure being taken as constant and the temperature of the surroundings being 15oC (cp of water = 4.2 kJ/kg K) (5)	2019 Dec	5 5
8	<ul> <li>a) An ice-making plant produces ice at atmospheric pressure and at 0°C from water. The mean temperature of the cooling water circulating through the condenser of the refrigerating machine is 18°C. Evaluate the minimum electrical work in kWh required to produce 1 tonne of ice (The enthalpy of fusion of ice at atmospheric pressure is 333.5 kJ/kg).</li> <li>b) Derive the expression for maximum work obtainable when heat transfer occurs between a finite body and a thermal energy reservoir. (6)</li> </ul>	2020 Nov	6

Q.No	Module IV	Month &	Marks
		Year	
1	a) Explain mollier chart, P-V, P-T, P-V-T diagrams for pure substances.(7)	2017 JULY	7
2	a) What is energy, dead state and triple point? (4)	2017 JULY	4
	b) A rigid vessel contains 1 kg of a mixture of saturated water and saturated steam at a pressure of 0.15 MPa. When the mixture is heated, the state passes through the critical point. Determine (i) The volume of the vessel (ii) The mass of liquid and of vapour in the vessel initially(iii) The temperature of the mixture when the pressure has risen to 3 MPa (iv) The heat transfer required to produce the final state. (6)		6
3	a) Explain the importance of the critical point during the phase change process of a pure substance using a $P_{\rm ev}$ diagram (4)	2018 April	4
	b) A pressure cooker contains 1.5 kg of saturated steam at 5 bars. Find the quantity of heat that must be removed from the steam so as to reduce the quality steam to 60% dry. What would be the pressure and temperature of the steam at the new state.		6
4	a) What are the reasons for the deviation of the real gas behavior from the ideal gas behaviour $(4)$	2018 Apri	4
	b) 5 kg of O2 has a volume of 4.5 m3 at 110°C. Compute the change in pressure of the gas by using the Van der Waals' equation compared to the ideal gas equation. Assume $a = 362850 \text{ Nm4 /(kg-mol)2}$ and $b = 0.0423 \text{ m3 /kg-mol. (6)}$		6
5	a) Discuss compressibility factor and law of corresponding states. (5)	2018 Dec	5
	with relevant constant property lines (3) a) Define the following: (1) Avogadro's Law (2) Equations of State (5)	2019 Dec	3
	a) Define Virial Expansion Also explain Law of corresponding state (6)	2010 Dee	5
	b) Explain Van der Waals equation of state. How does it differ from the Ideal gas equation of state? (4)	2019 Dec	4
	a) What is the critical state? Draw the phase equilibrium diagram on p-v		4
	coordinates for a substance which shrinks in volume on melting. (4) b) Steam initially at 0.3 MPa, 250°C is cooled at constant volume. (a) At what temperature will the steam become saturated vapour? (b) What is quality at 80°C? (c) What is the heat transferred per kg of steam in cooling from 250°C to 80°C?	2019 Mrch	6
Q.No	Module V	Month &	Marks
1	Derive Maxwell relations from basic thermodynamic relations? (10)	2017 July	10
1	Explain different properties of real gas mixtures and the laws associated. (10)	2017 July	10
2	a) Derive TDS Equations Explain Joule-Thomson coefficient and Inversion curve (5)	2018 April	10
	b) A vessel contains a mixture of 1 mole of CO2 and 4 moles of airat 1 bar and 20°C. Calculate for the mixture : i) The masses of CO2, O2 and N2 ii) The percentage carbon content by mass iii) The apparent molecular weight and the gas constant for the mixture iv) The specific volume of the mixture. The volumetric analysis of air can be taken as 21% oxygen and 79% nitrogen. (5)		5

3	. a) Derive Clausius clapeyron equation. (6)	2017 July	6
-	b) A certain gas has P c = $0.913$ and V c = $0.653$ kJ/kg K. Find the		
	molecular weight and the gas constant R of the gas. (6)		6
4	a) State and explain Amagat's law of partial volumes of a gas mixture	2018 Dec	10
	(10)		10
	b) Derive Maxwell's equations (10)		
	c) Discuss the Joule-Thomson effect with a T-P plot. Prove that Joule		10
	Thomson coefficient is zero for ideal gas.		
5			

CODE:	COURSE NAME:			
MCN202	CONSTITUTION OF INDIA			
Q.No	Module I	Month & Year	Marks	
1	Explain the preamble of Indian Constitution.	June 2022	3	
2	Give any five features of Constitution of India.	June 2022	3	
3	What do you mean by federal system of government? Give an example.	July 2021	3	
4	Explain the term citizenship and its types.	June 2022	7	
5	Discuss the term Union and its Territory.	June 2022	7	
6	How Indian Citizenship can be acquired?	June 2022	7	
_	What is preamble? Explain the importance of preamble in the			
7	implementation of constitution.	July 2021	6	
8	Write notes on methods of termination of Indian citizenship.	July 2021	6	
9	Define Constitution of India with comparison with other countries.	June 2022	1	
10				
Q.No	Module II	Month & Year	Marks	
1	Differentiate Rights and Duties with example.	June 2022	3	
2	What protection are available to the Indian citizen against conviction?	June 2022	3	
3	Explain the term fundamental rights and its classification	June 2022	7	
4	Explain right against exploitation and right to constitutional remedies.	June 2022	7	
5	What do you mean by Directive principles of state policy?	June 2022	7	
6	What are the fundamental duties of an Indian citizen?	June 2022	7	
7	Explain the concept of ,,equality before the law".	July 2021	3	
	"No person shall be prosecuted and punished for the same offence more		-	
8	than once." Discuss this clause.	July 2021	3	
9	Explain the concept of appeal by special leave.	July 2021		
10	Discuss the classification of Directive Principles of State Policy in	L-1 2021	0	
10	detail Distinguish hotseon fundamental nights and directive minoinles of state	July 2021	8	
11	policy	July 2021	7	
		July 2021	1	
	Module III	Month & Voor	Morlza	
	Module III Give the duties of Attorney General	Month & Year	Marks	
Q.No	Module III           Give the duties of Attorney General.           Write five specialities of Suprema court	Month & Year June 2022 June 2022	Marks 3	
Q.No 1 2 2	Module III           Give the duties of Attorney General.           Write five specialities of Supreme court.           Evaluation have Union Executive is cleated and formed	Month & Year           June 2022           June 2022           June 2022	Marks 3 3 7	
Q.No 1 2 3 4	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?	Month & Year           June 2022           June 2022           June 2022           June 2022           June 2022	Marks         3         3         3         7 <th 7<="" td="" th<=""></th>	
Q.No 1 2 3 4 5	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Pairs Sable and Lak Sable with five points.	Month & Year           June 2022           June 2022           June 2022           June 2022           June 2022           June 2022	Marks         3         3         3         7 <th 7<="" td="" th<=""></th>	
Q.No 1 2 3 4 5 (	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How con a citizen be quelified and disgualified as an MP2	Month & Year           June 2022	Marks 3 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	
Q.No 1 2 3 4 5 6 7	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Eventoin the generative for immediate of the Dravident of India	Month & Year           June 2022	Marks 3 3 7 7 7 7 7 7 2	
Q.No 1 2 3 4 5 6 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Emplain the procedure of Impeachment of the President of India	Month & Year           June 2022	Marks         3           3         7           7         7           7         7           7         3	
Q.No 1 2 3 4 5 6 7 8	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.	Month & Year           June 2022           Juny 2021           July 2021	Marks         3           3         7           7         7           7         3           8         8	
Q.No 1 2 3 4 5 6 7 8	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the constitutional position and essential qualifications ofVicenceident of India	Month & Year           June 2022           July 2021           July 2021	Marks         3           3         3           7         7           7         7           3         8	
Q.No 1 2 3 4 5 6 7 8 9 10	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain yarious kinds of jurisdiction of Supreme Court	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021	Marks 3 3 7 7 7 7 7 3 8 6 8	
Q.No  1  2  3  4  5  6  7  8  9  10  0 No	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain various kinds of jurisdiction of Supreme Court	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           Month & Veen	Marks         3           3         3           7         7           7         7           3         8           6         8           Marks         8	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain various kinds of jurisdiction of Supreme CourtModule IVExplain Writ Iurisdiction	Month & Year           June 2022           July 2021           July 2021           July 2021           Month & Year	Marks         3           3         3           7         7           7         3           8         6           8         Marks           3         3	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor	Month & Year           June 2022           July 2021	Marks         3         3         7         7         7         7         7         7         7         7         3         8         8         6         8         Marks         3         2         3         2         3	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 2 2 2 2	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           June 2022           June 2022           June 2022           June 2022	Marks           3           7           7           7           7           3           8           6           8           Marks           3           3	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 4 5 6 7 8 9 10 Q.No 1 2 3 4 4 5 6 7 8 9 10 1 2 3 4 4 5 6 7 8 9 10 10 1 2 3 4 10 10 10 10 10 10 10	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory.	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           June 2022           June 2022           June 2022           June 2022	Marks           3           7           7           7           7           3           8           6           8           Marks           3           3           7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 5 6 7 8 9 10 Q.No 1 2 3 4 5 5 6 7 8 9 10 2 5 5 5 6 7 8 9 10 2 5 5 5 6 7 8 9 10 2 5 5 5 6 7 8 9 10 2 5 5 5 5 5 5 5 5 5	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory.         Explain State Legislative Assembly in detail.         Disause about Invidiction of High accurt	Month & Year           June 2022           July 2021           June 2022	Marks         3           3         3           7         7           7         7           7         3           8         6           8         6           8         3           3         3           7         7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 7 9 10 2 5 6 7 7 8 7 9 10 2 5 6 7 7 8 7 7 8 7 7 8 7 9 10 7 7 8 7 7 8 7 7 7 8 7 7	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory.         Explain State Legislative Assembly in detail.         Discuss about Jurisdiction of High court.	Month & Year           June 2022           Juny 2021           July 2021           June 2022	Marks           3           3           7           7           7           7           3           8           6           8           3           3           3           7           7           7           7           7           7           7           7           7           7           7           7           7           7           7           7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 2 5 6 7 8 9 10 7 8 7 8 9 10 7 8 7 8 7 8 9 10 7 8 7 8 7 9 10 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 9 10 7 8 7 8 7 8 7 8 7 8 8	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain various kinds of jurisdiction of Supreme CourtModule IVExplain the role of GovernorDifferentiate State Government and Union Territory.Explain State Legislative Assembly in detail.Discuss about Jurisdiction of High court.Explain State Legislative Council in detail	Month & Year           June 2022           July 2021           June 2022	Marks         3         3         7         7         7         7         7         7         7         7         7         7         3         8         8         6         8         Marks         3         3         7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 7 8 9 10 2 3 4 5 6 7 7 8 7 9 10 7 8 8 9 10 7 8 7 9 10 7 8 7 7 8 7 7 8 7 8 7 7	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain various kinds of jurisdiction of Supreme CourtModule IVExplain the role of GovernorDifferentiate State Government and Union Territory.Explain State Legislative Assembly in detail.Discuss about Jurisdiction of High court.Explain the procedure for the appointment of chief minister.	Month & Year           June 2022           Juny 2021           July 2021           July 2021           July 2021           June 2022	Marks 3 3 7 7 7 7 7 7 3 8 6 8 Marks 3 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 8 9 10 Q.No 1 2 3 4 5 6 7 8 8 9 10 Q.No 1 8 8 9 10 2 3 4 8 8 9 10 2 8 8 9 10 8 8 9 10 2 8 8 9 10 8 8 9 10 8 8 9 10 8 8 9 10 8 8 8 9 10 8 8 9 10 8 8 8 9 10 8 8 8 9 10 8 8 8 9 10 8 8 8 8 8 8 8 8 8	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain various kinds of jurisdiction of Supreme CourtModule IVExplain the role of GovernorDifferentiate State Government and Union Territory.Explain State Legislative Assembly in detail.Discuss about Jurisdiction of High court.Explain the procedure for the appointment of chief minister.Explain the procedure for the appointment of chief minister.	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           June 2022	Marks         3         3         7         7         7         7         7         7         7         7         3         8         6         8         Marks         3         3         3         3         3         3         3         7         7         7         7         7         7         7         7         7         7         7         7         3	
Q.No  1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 6 7 8 6 7 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Module IIIGive the duties of Attorney General.Write five specialities of Supreme court.Explain how Union Executive is elected and formed.What are the different functions of Parliament?Differentiate Rajya Sabha and Lok Sabha with five pointsHow can a citizen be qualified and disqualified as an MP?Explain the procedure for impeachment of the President of IndiaExplain the powers of President of India.Explain the constitutional position and essential qualifications ofVicepresident of IndiaExplain various kinds of jurisdiction of Supreme CourtModule IVExplain the role of GovernorDifferentiate State Government and Union Territory.Explain State Legislative Assembly in detail.Discuss about Jurisdiction of High court.Explain the procedure for the appointment of chief minister.Explain the qualification and disqualification for membership of the	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           June 2022	Marks         3         3         7         7         7         7         7         7         7         7         7         3         8         8         6         8         Marks         3         3         3         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         3	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 9 10 Q.No 1 2 3 4 5 6 7 8 9 9 10 Q.No 9 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 9 10 9 9 9 10 9 9 9 9 9 9 9 9 9	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory.         Explain State Legislative Assembly in detail.         Discuss about Jurisdiction of High court.         Explain the procedure for the appointment of chief minister.         Explain the duties of advocate general of the state.         Explain the qualification and disqualification for membership of the state legislature	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           July 2021           June 2022           June 2022	Marks           3           7           7           7           7           3           8           6           8           6           8           3           7           7           7           7           7           7           7           7           7           7           3           3           7           7           7           7           7           7           7           7           7           3           3           7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 9 10 Q.No 1 2 3 4 9 10 1 2 3 4 9 10 1 2 3 4 9 10 1 2 3 4 9 10 1 2 3 4 9 10 1 2 3 4 9 10 1 2 3 4 5 6 7 8 9 10 2 3 4 9 10 1 2 3 4 9 10 1 2 3 4 9 10 10 2 3 4 9 10 10 2 3 4 9 10 10 10 2 3 4 9 10 10 10 10 10 10 10	Module III           Give the duties of Attorney General.           Write five specialities of Supreme court.           Explain how Union Executive is elected and formed.           What are the different functions of Parliament?           Differentiate Rajya Sabha and Lok Sabha with five points           How can a citizen be qualified and disqualified as an MP?           Explain the procedure for impeachment of the President of India           Explain the powers of President of India.           Explain the constitutional position and essential qualifications of           Vicepresident of India           Explain various kinds of jurisdiction of Supreme Court           Module IV           Explain the role of Governor           Differentiate State Government and Union Territory.           Explain State Legislative Assembly in detail.           Discuss about Jurisdiction of High court.           Explain the procedure for the appointment of chief minister.           Explain the duties of advocate general of the state.           Explain the duties of advocate general of the state.           Explain the constitution of High court. What are the essential qualification for membership of the state legislature	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           July 2021           July 2021           July 2021           July 2021	Marks         3         3         7         7         7         7         7         7         7         7         3         8         6         8         Marks         3         3         7         3         3         3         7         7         7         3         3         3         7         7         7         7         3         3         3         7         7         7         7         7         7         3         3         3         7         7         7         7         7         7         7         3         3         3         7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 9 10 2 3 4 9 10 2 7 8 9 10 2 2 2 3 4 9 10 2 2 2 3 10 9 10 2 2 2 2 2 2 2 2 2	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain various kinds of jurisdiction of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory.         Explain State Legislative Assembly in detail.         Discuss about Jurisdiction of High court.         Explain the procedure for the appointment of chief minister.         Explain the procedure for the appointment of chief minister.         Explain the qualification and disqualification for membership of the state legislature         Explain the constitution of High court. What are the essential qualifications required for the appointment of High court Judge?	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           Juny 2021           July 2021           July 2021           July 2021           July 2021	Marks         3         7         7         7         7         7         3         8         6         8         6         8         3         7         7         7         7         7         3         3         7 <tr td=""></tr>	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 2 10 2 10 2 10 10	Module III           Give the duties of Attorney General.           Write five specialities of Supreme court.           Explain how Union Executive is elected and formed.           What are the different functions of Parliament?           Differentiate Rajya Sabha and Lok Sabha with five points           How can a citizen be qualified and disqualified as an MP?           Explain the procedure for impeachment of the President of India           Explain the powers of President of India.           Explain the constitutional position and essential qualifications of           Vicepresident of India           Explain various kinds of jurisdiction of Supreme Court           Module IV           Explain the role of Governor           Differentiate State Government and Union Territory.           Explain State Legislative Assembly in detail.           Discuss about Jurisdiction of High court.           Explain the procedure for the appointment of chief minister.           Explain the qualification and disqualification for membership of the state legislature           Explain the constitution of High court. What are the essential qualifications required for the appointment of High court Judge?           Module V	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           July 2021           July 2021           July 2021           July 2021           July 2021           Month & Year           June 2022	Marks         3         7         7         7         7         7         3         8         6         8         6         8         3         7         7         7         7         7         7         7         7         3         3         7	
Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 2 3 10 2 3 1 1 2 3 1 1 2 3 1 1 2 1 2 3 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain the constitutional position of Supreme Court         Module IV         Explain the role of Governor         Differentiate State Government and Union Territory.         Explain State Legislative Assembly in detail.         Discuss about Jurisdiction of High court.         Explain the procedure for the appointment of chief minister.         Explain the qualification and disqualification for membership of the state legislature         Explain the constitution of High court. What are the essential qualifications required for the appointment of High court Judge?         Module V         What is the procedure for amending the Constitution?	Month & Year           June 2022           July 2021           July 2021           July 2021           July 2021           June 2022           June 2021           July 2021           June 2022	Marks           3           7           7           7           7           7           3           8           6           8           6           8           7           3           3           7           7           7           7           7           3           3           3           3	
Q.No  1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 Q.No 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 1 2 3 1 1 1 2 3 1 1 1 2 3 1 1 1 2 3 1 1 1 1	Module III         Give the duties of Attorney General.         Write five specialities of Supreme court.         Explain how Union Executive is elected and formed.         What are the different functions of Parliament?         Differentiate Rajya Sabha and Lok Sabha with five points         How can a citizen be qualified and disqualified as an MP?         Explain the procedure for impeachment of the President of India         Explain the powers of President of India.         Explain the constitutional position and essential qualifications of         Vicepresident of India         Explain the constitutional position of Supreme Court         Module IV         Explain Writ Jurisdiction.         Explain the role of Governor         Differentiate State Government and Union Territory.         Explain State Legislative Assembly in detail.         Discuss about Jurisdiction of High court.         Explain the procedure for the appointment of chief minister.         Explain the qualification and disqualification for membership of the state legislature         Explain the constitution of High court. What are the essential qualifications required for the appointment of High court Judge?         Module V         What is the procedure for amending the Constitution?         Why administrative tribunals are established?         How is Central and State Government related on economis	Month & Year           June 2022           June 2021           July 2021           July 2021           July 2021           June 2022           Juny 2021           July 2021           July 2021           July 2021           July 2021           June 2022           June 2022	Marks         3         3         7         7         7         7         7         7         7         3         8         6         8         Marks         3         3         7         3         3         3         7         7         7         7         7         3         3         3         7	

	Explain how the constitution handles an emergency situation in the		
4	country.	June 2022	7
5	Which are the functions of Comptroller and Auditor General of India?	June 2022	7
6	Explain the role of Public Service Commission	June 2022	7
	Explain the distribution of tax revenue with respect to centre-state		
7	financial relation.	July 2021	3
8	Explain parliamentary legislation in the state field.	July 2021	6
9	Discuss the effects of national and financial emergencies	July 2021	8
10	Explain the procedure for amendment of the constitution.	July 2021	6

CODE: EST 200	DESIGN AND ENGINEERING		Credit:
Q.No	Module I	Month & Year	Marks
	Give the main objective and constraint for the design of (i) The main entrance door to a house, (ii) The door of a room within the house, (iii) Door to a bathroom inside the house	June 2017	
1	nouse.		5
	Two different designs of helmets are shown in the figure 'A' and figure 'B'. Compare their merits and demerits.	June 2017	
2	Figure 'A' Figure 'B'		5
	Disassemble the book shelf shown in figure 'D'. Use the materials to make another useful product. Show that the wastage of material is minimal.	June 2017	
3			10
4	Give the main objective and constraints of a train door and a bus door as applicable for aged person (>70 years).	Dec 2019	5
5	Sketch a traditional steel folding chair and identify its parts. Identify any 3 'Design for X' for the folding chair.	Dec 2019	5
6	You are asked to design a water bottle for primary school children. Describe the design objectives, constraints and functions in the design process.	June 2016	6
7	Prepare a questionnaire for market survey that you propose to do for a modified design for a pen stand.	Dec 2018	5
8	Describe the factors to be considered for the material selection in the design of an umbrella.	Dec 2018	5
9	Prepare a feedback questionnaire with minimum eight questions for a new school bag introduced in the market.	Dec 2019	5
Q.No	Module II	Month & Year	Marks
1	Describe the role of prototyping in engineering the design of a car	Dec 2018	5

	In certain situations, users require extra length for their mobile charger cable. But offering extra cable length becomes an issue while normal		
	design to effectively solve this problem. Also give the objectives and		
2	of your design.	Dec 2018	5
3	Make a creative design for a water bottle for school kids.	Dec 2018	5
4	Present the major constraints faced by rescue workers for emergency patient handling during accidents in crowded areas or natural calamities. Present the key objectives of your design.	June 2017	5
5	Design a mobile transport device to carry emergency patients. Give the advantages of your design and make a comparative analysis	Dec 2019	5
6	Sketch the design of a TV remote showing important buttons.	Dec 2018	5
7	State the design objectives, design constraints and design function of the fire extinguisher given below	Dec 2019	10
8	List at least 10 standard parts that are commonly used in a completed residential building.	Dec 2018	10
9	Sketch an attachment for a blackboard in a class room for placing the chalks and the remote of the LCD projector securely.	June 2017	5
Q.No	Module III	Month & Year	Marks
Q.No	Module III           Identify the design for X of the following roofing materials. Justify your answer.           i) Tiles         ii) Sheets         iii) Concrete	Month & Year	Marks
<b>Q.No</b>	Module III         Identify the design for X of the following roofing materials. Justify your answer.         i) Tiles       ii) Sheets         iii) Concrete	Month & Year June 2018	<b>Marks</b> 6
Q.No	Module III         Identify the design for X of the following roofing materials. Justify your answer.         i) Tiles ii) Sheets iii) Concrete         Implement value engineering concepts to solve the food waste problems in hotels and restaurants.	Month & Year June 2018 Dec 2018	Marks 6 5
Q.No	Module III         Identify the design for X of the following roofing materials. Justify your answer.         i) Tiles ii) Sheets iii) Concrete         Implement value engineering concepts to solve the food waste problems in hotels and restaurants.         Bring out the features of user centered design and Product centered design with the help of examples for each	Month & Year June 2018 Dec 2018	Marks 6 5
Q.No	Module III         Identify the design for X of the following roofing materials. Justify your answer.         i) Tiles ii) Sheets iii) Concrete         Implement value engineering concepts to solve the food waste problems in hotels and restaurants.         Bring out the features of user centered design and Product centered design with the help of examples for each         Write any five points comparing the designs of food plates shown below         Output	Month & Year June 2018 Dec 2018 Dec 2019	Marks 6 5

	The sketch below shows a plain saucer for placing the cup. What change can improve the saucer design?		
5		Sep 2016	5
	<ul> <li>People throw bits of paper and plastics on the road. Design a bin for dropping these wastes to be kept at the bus stops. Design needs are as follows:</li> <li>i) The bin is theft proof (Cannot be removed from the place easily).</li> </ul>		
	<ul> <li>ii) The bin is there proof (Califict be removed from the place easily)</li> <li>iii) Rain water cannot get into the bin even when it is kept under a roof.</li> <li>iii) Wind cannot blow out the contents.</li> <li>iii) Easy to remove the contents of the bin without taking out the bin.</li> <li>iv) Aesthetically designed.</li> </ul>		
6		Sep 2016	10
Q.No	Module IV	Month & Year	Marks
	A round glass of 600 mm diameter and 6 mm thick is available. This is to be designed as a table supported at three points by a steel tube bent in any convenient way. The height of the table is to be 300 mm and the total length of the tube used should not exceed 1.8 m. The tube should not be cut or joined. Design the bent tube for supporting the table.		
1	Support Points Glass Sheet	July 2016	10
2	How modular design is realized in a bicycle? Draw the different modules involved in this product.	Dec 2018	10
3	Design a study table for school children on the basis of design for (i) Manufacture (ii) Assembly and disassembly (iii) Safety?	Dec 2019	10
4	Modify the design of the conventional umbrella so that the below mentioned problems can be solved. The floor becomes wet once you close the umbrella and put it on the floor after a rain. Opening of umbrella in a crowd can hurt people	June 2017	6

5	Bring out 2 design changes that will increase the value in case of a waste bin.	Dec 2019	5
	Identify all the possible customers of a washing machine and prepare questionnaires for each group		
6		Dec 2019	5
	A normal water bottle is shown below.		
	Design a water bottle for kids (Age group: 4 to 6 years) so that they are always happy to use		
	it. Mention the special features you would incorporate in it to achieve this. Give a simple sketch of your design.		
7		Sep 2016	10
	Propose a solution for effective waste collection (food waste, plastic and		
8	medical waste) and safe disposal of the collected waste. Give the advantages of your design and make a comparative analysis	Dec 2018	5
Q.No	Module V	Month & Year	Marks
1	In any good design, many standard parts are used. List at least 10 standard parts that are used in a completed residential house.	Sep 2016	10
2	Over years, lot of workers have met with accidents while doing electrical maintenance works as part of their job in KSEB. Prepare a questionnaire to be distributed among the employees of KSEB to find out the main reason behind these accidents. Assuming that attempting to work on a live line unknowingly is the main reason, suggest a possible solution to avoid such type of accidents. The solution may be explained with the help of layout/ block diagram /sketches.	Dec 2018	6
3	<ul> <li>a) Highlight the major difficulties faced by disabled persons while travelling in trains. (2) b) Draw neatly labeled sketches of design modifications that can be done to solve any two such problems.</li> </ul>	Dec 2019	5
4	Describe the role of colours in the design of any two products.	Sep 2016	5
5	Considering the principle of value engineering, design a suitable product		

	How modular design is realized in i) Umbrella and ii) Ink Pen? Draw the different modules involved in each of these products.			
6		Sep 2016	5	