Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2021

Course: Work Study & Ergonomics (MEPD3008**)** **Semester: VI**
Program: B.Tech. Mechanical **Time: 3 Hours**
Max. Marks: 100

SECTION A

Note: All the questions are compulsory

S. No.		Marks	CO
Q-1	Work study is concerned with (a) improving present method and finding standard time (b) motivation of workers (c) improving production capability (d) improving production planning and control (e) all of the above.	**5**	CO1
Q-2	Basic tool in work study is (a) graph paper (b) process chart (c) planning chart (d) stop watch (e) analytical mind.	**5**	CO1
Q-3	What does symbol 'O' imply in work study (a) operation (b) inspection (c) transport (d) delay/temporary storage (e) none of the above.	**5**	CO1
Q-4	What does symbol 'D' imply in work study (a) inspection (b) transport (c) delay/temporary storage (d) permanent storage (e) none of the above.	**5**	CO1

Q-5	Work study is most useful (a) where production activities are involved (b) in judging the rating of machines (c) in improving industrial relations (d) in judging the output of a man and improving it (e) where men are biggest contributor to success of a project.	**5**	CO1
Q-6	Micro motion study is (a) enlarged view of motion study (b) analysis of one stage of motion study (c) minute and detailed motion study (d) subdivision of an operation into therbligs and their analysis (e) motion study of small components upto mirco-seconds.	**5**	CO1
	SECTION B		
Q-7	The following are the particulars applicable to a process: Time Rate — Rs. 8 per hour, High Task — 200 units per week. In a 40 hour week, the production of the workers was: A — 180 units; B — 200 units; C — 205 units. Calculate the total earnings of the workers under Gantt's Task Bonus system OR The following particulars apply to a particular job: Standard production per hour 6 units Normal rate per hour Rs.1.20 Mohan produced 32 units Ram produces 42 units Prasad produces 50 units Calculate the wages of these workers under Merrick Differential Piece Rate System	**10**	CO3
Q-8	Calculate the earnings of workers A and B under Straight Piece-rate System and Taylor's Differential Piece-rate System from the following particulars: Normal rate per hour = Rs 1.80 Standard time per unit = 20 seconds Differentials to be applied: 80% of piece rate below standard 120% of piece rate at or above standard. Worker A produces 1,300 units per day and worker B produces 1,500 units per day.	**10**	CO3
Q-9	What is anthropometry? Define minimum and maximum dimension with 5 different examples.	**10**	CO2
Q-10	A work study engineer conducted stopwatch time study on a job for taking the observations the job was divided into 5 elements. The observations made on 4 cycles (in minutes) of all the 5 elements are shown in the table given below. Calculate the normal time and standard time for the job. If relaxation allowances of 12 %, contingency allowance if 3% and incentive of 20 % are applicable for the job.	**10**	CO3

Element	Time (minutes) for Cycle				Performance Ratting
	1	2	3	4	
1	1.246	1.328	1.298	1.306	90
2	0.972	0.895	0.798	0.919	100
3	0.914	1.875	1.964	1.972	100
4	2.121	2.198	2.146	2.421	110
5	1.253	1.175	1.413	2.218	100

Q-11	A metal component is required to be produced in a large number (approximately 1000/day). Two successive milling operations are required which are done on milling machines with automatic feed. The operator need not attend to the machine during the machining operation of the cycle. The operating characteristic of the two operations are as given below; On the average these machines are working approximately 75 % of the 8 Hr working a day. What arrangement of men and machines would you recommend? Support your answer with suitable multiple activity chart. You may assume any convenient arrangement of machines.	**10**	CO2

	Operation1	Operation2
Unload	.12 minute	.11 minute
Load	.19 minute	.15 minute
mill	.38 minute	.45 minute

SECTION C

Q 12	A stop watch time study has been made of an operation which consist of four elements. The table below gives the continuous time readings (in centiminutes), ratings and allowances for the elements. Determine i. Basic time and standard time for each element. ii. Standard of operation. iii. Whether the number of operations are sufficient for each element if the desired confidence level is 90% and accuracy required is ± 5%.	**20**	**CO4**

Element	1	2	3	4
Observation	Continuous stop watch readings (Centimin.)			
1	9	15	28	32
2	40	46	59	62
3	71	80	94	97
4	106	113	127	130

		5	138	143	156	159		
		6	167	172	184	188		
		7	198	203	218	221		
		8	228	233	246	249		
		9	257	262	275	279		
		10	288	293	306	309		
		Avg. Rating (%)	105	110	100	90		
		Allowance (%)	15	10	20	25		
		OR						
		What is material type process flow chart, explain with the example of any workshop lab activity. (Consider the approximate time and distance)						