

SECTION – A

There are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) What are the standard accessories of a lathe machine? Why these accessories are called “standard accessories”? Describe their related mechanisms and applications with necessary sketches. (18)
- (b) Discuss different types of collet chucks used in turret lathe with appropriate sketches. (9 $\frac{2}{3}$)
- (c) In which method(s) of taper turning do you need to swivel the swivel plate of a lathe machine? Describe the method(s) in detail (12)
- (d) Why do you need to off-set the tail stock of a lathe machine? Can you off-set the tail stock in vertical direction? (7)
2. (a) In which gear cutting method do you need to engage the spindle of the diving head to the feeding screw of the table or the hand wheel of the table of a milling machine? Describe that Principle of gear cutting in detail. (20)
- (b) How can you understand that the generating principle generates involute profile? Give reasons with necessary sketch(es). (10 $\frac{2}{3}$)
- (c) What are the machine tool acceptance tests? Describe them in detail. How do you measure the kinematic accuracy of a gear shaper? Explain. (16)
3. (a) What are the requirements of machine tool structure ? Why does the cast iron preferable than Mild steel as structural material? (18)
- (b) What are the motions involved in helical gear cutting a gear shaper? Describe them in detail. (12)
- (c) What are the features of a hob cutter? (8)
- (d) Should the feed-in motion be equal to half of the full depth of the gear to be cut in double pass system in gear shaper? Describe the double pass system in detail. (8 $\frac{2}{3}$)
4. (a) Why is preloading necessary in a spindle bearing assembly? (10 $\frac{2}{3}$)
- (b) Why does bearing spacing in a spindle needs to be optimized? Explain how optimum bearing spacing with minimum amount of deflection can be obtained. (20)
- (c) Explain the 3-2-1 principle of locating a part along other locating guidelines. (16)

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SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

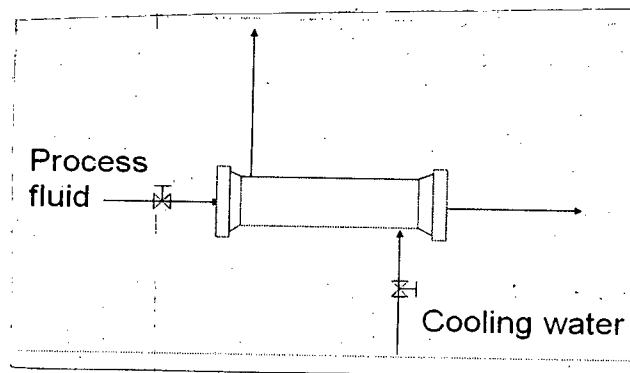
5. (a) What do you understand by Economic Cutting Speed and why it is important? Derive the expression of progression ratio from the concept of economy in cutting speed. **(20)**
- (b) Show that, Transmission ratios are powers of standard progression ratios. **(16)**
- (c) Show that, the number of teeth of adjacent gears of a cluster must be at least 4 (assumed that all gear has the same module) **(10²/₃)**
6. (a) Explain briefly the clearance adjustment methods of flat and dovetail slideways with necessary sketches. **(20)**
- (b) Explain briefly the working principle of PIV drive with neat sketch. For a PIV drive show that, **(16)**
- $$\frac{P_{\max}}{P_{\min}} = \frac{T_{\max}}{T_{\min}} = \frac{d_{\max}}{d_{\min}} = \sqrt{R_n}$$
- (c) Differentiate hydrostatic and hydrodynamic slideways based on their working principle. **(10²/₃)**
7. (a) The following data are provided for designing of a stepped speed gear box. **(30)**
- Minimum output (rpm), $n_{\min} = 120$
- Maximum output (rpm), $n_{\max} = 1400$
- Number of speed steps, $z = 8$
- Number of stages, $u = 2$
- Draw all possible structural diagrams by using different combination of number of speed steps and select the best one. Provide adequate reasoning for your selection. **(16²/₃)**
- (b) How do hydraulic tracer control unit works? Explain with neat sketch. **(16²/₃)**
8. (a) For a combination of Vee and Flat slideways, derive the expression of unknown forces acting perpendicular to the surface of the slideways **(20)**
- (b) What are the difference between NC and CNC machine tools? Explain briefly the different parts of a NC machine tool with their functions. **(16)**
- (c) Write some advantages and disadvantages of hydraulic drive system. **(10²/₃)**
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SECTION – A

There are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) Write in detail about the lighting design consideration. (15)
 (b) How the risk of manual material handling overexertion can be reduced? (10)
 (c) What would be the energy expenditure of a worker who lifts a 20 kg weight 15 times per hour from 40 inch height to 60 inch height? The energy consumption of the worker is 4 g-cal/ft-lb. (10)
 Does your answer fall within the recommended limit provided by Frederick?

2. (a) Investigate the following accidental case and write down the steps that might be taken to prevent this type of accident. (12)
 A laborer working in a trench was suffocated under a mass of earth when the unshored wall of the trench caved in.
 (b) Using relevant guide words, perform HAZOP study on shell & tube heat exchanger given in the figure below. (15)



- (c) What are the significance of frequency rate and severity rate? (8)

3. (a) List the possible hazards that workers might face in a particular operation in which they handle hazardous materials. Discuss and illustrate the personal protective equipments for these workers. (15)
 (b) If you were a safety manager, what would be some strategies you would use to improve plant safety? (10)
 (c) Compare and contrast between insert and muff type protectors. (10)

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4. (a) Discuss the classification of fires. Why is it important for the safety engineer to know them? (10)
- (b) What is the primary cause of fire fatalities? Discuss the air contaminants generally found in fires. (10)
- (c) Briefly discuss what types of fire detector would be most appropriate for a small, confined place where speed of detection is not the prime consideration. (15)

SECTION - B

There are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) What do you understand by workspace envelope? Describe the variables that limit the workplace envelopes for seated personnel. (20)
- (b) Justify "Metabolic processes carried out within muscle must be supported by cardiovascular and respiratory system of the body". (10)
- (c) What are the recommendations for seat back on the chairs for computer workstations? (5)
6. (a) Write in details about the variables that influence the level of stress in the body during lifting. (20)
- (b) Is there any effect of glove materials on manual performances? Justify your answer. (10)
- (c) What is maximum aerobic power (MAP)? How can it be measured? (5)
7. (a) Write in details about the problems that would occur if straight wrist is not maintained in designing the hand tools. (15)
- (b) Write down the shortcomings of the standards of video display terminal (VDT). (10)
- (c) Write short notes on (10)
- (i) Design for safe operation (ii) Work Rest cycle.
8. (a) Describe the process of hearing. What are the health effects of excessive noise? (15)
- (b) What are the three main types of lighting source? Write down the characteristics of light sources. (10)
- (c) What is RASH? Calculate the sitting height of Australian bus drivers, which cannot be directly found. However, only Brazilian male mean data and standard deviation of stature and sitting height can be found, which are respectively 170 cm, s.d 6.6 cm and 88 cm, s.d. 3.5 cm. The mean and standard deviation (s.d.) of stature of the Australian bus drivers are 175 cm and 6 cm, respectively. (10)
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SECTION – AThere are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) What are the commercial and technological importance of robot? (10)
 (b) Differentiate joints and links. Explain how joints and links are related to the degree of freedom for robot arms. Draw a typical configuration of a wrist assembly. (10)
 (c) What is an end effector? Classify and explain different types of end effectors. (15)
2. (a) What is the difference between sequencing and logic control? Explain with examples. (7)
 (b) For starting and stopping an electric motor two push button switches START and STOP are used. When START button is pressed, power is supplied and maintained to the motor until the STOP button is pressed. Draw the logic network diagram and truth table for the system. (20)
 (c) What are the main advantages of PLCs over conventional relays, timers, counters etc? (8)
3. (a) What is an FMS? Briefly explain the benefits of FMS. (5)
 (b) Classify flexible manufacturing systems based on the kinds of operations they perform. Differentiate SMC, FMC and FMS. (10)
 (c) Discuss major activities performed by the computer control system for FMS. (20)
4. (a) "CAD/CAM" implies that CAD and CAM systems are Seamlessly integrated. Do you agree? Explain why. (15)
 (v) What is CIM? Discuss in detail including the scope of CAD/CAM in CIM systems. (20)

SECTION – BThere are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) Briefly describe the three important considerations in designing a material handling system. (12)
 (b) What are MAP and TOP? How can those relate with each other? (8)
 (c) Derive the sequence of operations for the following machine cell along with product flow: (15)

From	To					
	A	B	C	D	E	F
A	-	5	25	10	30	20
B	10	-	20	15	10	30
C	25	20	-	35	-	-
D	5	15	35	-	15	25
E	15	-	5	20	-	30
F	30	15	-	10	25	-

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- 6. (a) Explain the working principle of "Self guided" AGV. (8)
- (b) What are the two different types of bar codes? Discuss with appropriate examples. (8)
- (c) What are the different levels of hierarchical structure in network? Discuss. (6)
- (d) Identify part families and corresponding machine groups for the following part-machine matrix using "rank order clustering" Technique: (13)

Machine	Part											
	A	B	C	D	E	F	G	H	I	J	K	L
1	1				1		1		1		1	
2			1	1		1			1			1
3	1		1			1		1		1		
4		1	1		1					1		
5				1		1		1	1			1
6	1		1		1		1			1		
7		1	1				1			1		1
8				1	1	1			1		1	1
9	1		1		1					1		
10	1	1		1		1						1
11			1	1			1	1	1		1	

- 7. (a) What are the four different steps in "Production Flow Analysis"? (8)
- (b) Classify different types of AS/RS system with appropriate application. (6)
- (c) White and black are the two colors which are most commonly used in bar code- why? (4)
- (d) How the electrical signal is recognized between white and black as well as thin and thick bass? (5)
- (e) For the following component (Fig. 7c) write the form codes based on Opitz system: (12)

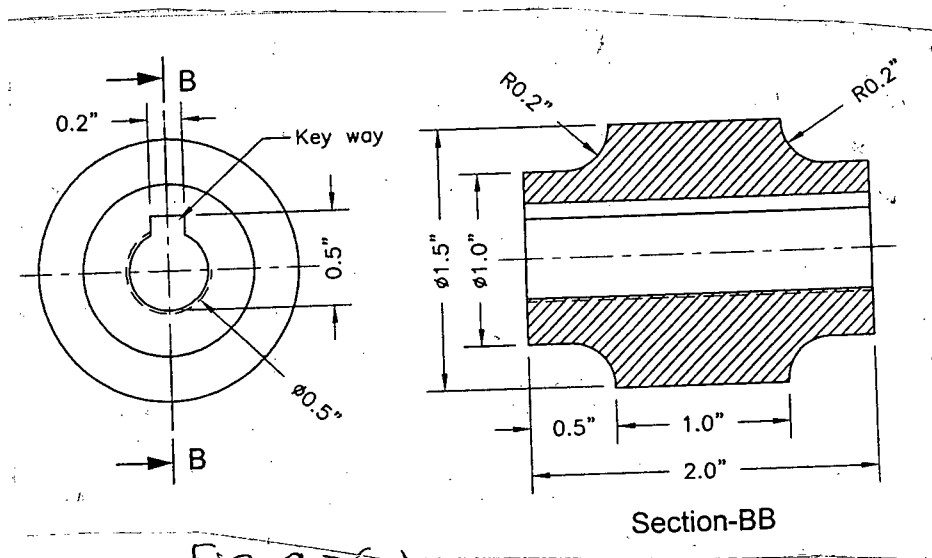


Fig. Q7(c)

- 8. Compare retrieval and generative CAAP systems. Briefly explain different ingredients required for a fully generative process planning system. (15)
- (b) What is route sheet? Explain different parts of a route sheet with an appropriate example. (12)
- (c) What are the important decisions usually included within the scope of process planning? Briefly discuss. (8)

Digit 1		Digit 2		Digit 3		Digit 4		Digit 5				
Part class		External shape, external shape elements		Internal shape, internal shape elements		Plane surface machining		Auxiliary holes and gear teeth				
Rotational parts	0	L/D ≤ 0.5		0	Smooth, no shape elements		0	No surface machining		0	No auxiliary hole	
	1	0.5 < L/D < 3		1	No shape elements		1	Surface plane and/or curved in one direction, external		1	Axial, not on pitch circle diameter	
	2	L/D ≥ 3		2	Stepped to one end or smooth	Thread	2	External plane surface related by graduation around the circle		2	Axial on pitch circle diameter	
	3			3		Functional groove	3	External groove and/or slot		3	Radial, not on pitch circle diameter	
	4			4	Stepped to both ends	No shape elements	4	External spline (polygon)		4	Axial and/or radial and/or other direction	
	5			5		Thread	5	External plane surface and/or slot, external spline		5	Axial and/or radial on PCD and/or other directions	
6			6	Functional groove		6	Internal plane surface and/or slot		6	Spur gear teeth		
Nonrotational parts	7	Functional cone		7	Functional cone		7	Internal spline (polygon)		7	Bevel gear teeth	
	8	Operating thread		8	Operating thread		8	Internal and external polygon, groove and/or slot		8	Other gear teeth	
	9	All others		9	All others		9	All others		9	All others	



SECTION - AThere are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) Briefly explain the life cycle of a construction project. (8)
- (b) What are the two important issues that need to be addressed during data collection in project monitoring? Discuss. (6)
- (c) With appropriate example, distinguish dedicated organization structure from heavy matrix structure. (8)
- (d) For the following activity table, obtain a schedule to level the manpower requirement: (13)

Activity	Duration (hr)	Manpower reqd.
1 - 2	4	10
1 - 3	5	4
2 - 3	8	5
2 - 4	8	6
3 - 4	4	7

2. (a) Briefly explain six different types of project evaluation criteria. (12)
- (b) Project crashing is a technique to reduce the project duration at a cost of increased budget. What are the reasons to reduce the project duration at mid level of the project? (8)
- (c) For the following task table, draw the network diagram, calculate project duration, find the critical path and calculate slack time for each task: (15)

Task	Predecessor	Duration (days)
A	—	5
B	—	7
C	—	8
D	A, B	4
E	B	9
F	B, C	11
G	E	6
H	E, F	10
I	G	12
J	H	7
K	I, J	8

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- 3. (a) What is time-phased budget? Explain with neat sketch. (6)
- (b) What are the three different types of cybernatic control mechanism— elaborate? (12)
- (c) What is linear responsibility chart? Why the chart is called linear? (5)
- (d) For the following cash flow table, find the best suitable project of the two based on Net Present Value (NPV) and Discounted Payback Period (with 12% discount rate): (12)

Year	Project 1	Project 2
0	\$ -3,00,000	\$ -3,00,000
1	65,000	1,00,000
2	75,000	80,000
3	75,000	75,000
4	80,000	70,000
5	60,000	60,000
6	60,000	50,000
7	60,000	30,000

- 4. (a) Briefly discuss how to collect data in monitoring a financial project. (8)
- (b) What are the especial demands that a person should have to be a project manager? (8)
- (c) Explain the four important criteria for breaking down a project into several parts. (10)
- (d) Consider a project that requires 50 units of a product to be produced. An expert worker takes 27 hrs time to complete a single product. However 42 units need to be completed for a worker to become an expert at 75% learning rate. If the wage rate of an operator is Tk. 150/- per hr, by which amount the budget will be underestimated if the learning effect is not considered? (9)

SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

- 5. (a) What is "Biosphere"? Explain. (15)
- (b) Differentiate "Ecosystem" and "Habitat". (15)
- (c) Where do meteors burn up? (5)

- 6. (a) Explain Audit and Certification systems of ISO14000 EMS. (15)
- (b) State in brief the history of Environmental rules and regulations in Bangladesh. (15)
- (c) What are ICTPs? State the titles of two major ICTPs. (5)

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7. (a) What are the technical and planning alternatives of environmental prevention program? **(10)**
- (b) Explain the major steps of operations of ETP of a textile dyeing process. **(25)**
8. (a) Conflict is an inherent part of a project. The best way to negotiate a conflict between two team members is to create a win-win situation. Justify your answer with appropriate example. **(10)**
- (b) Uniqueness is an important criterion of a project. However, all the components or parts may not be unique for different projects. Briefly explain the unique components of a construction project. How can you estimate the costs of those unique components? **(10)**
- (c) For the following task table, find different possible crash times and corresponding costs for the project. **(15)**

Activity	Predecessor	Duration		Cost	
		Normal	Crash	Normal	Crash
a	—	3	3	40	40
b	a	3	2	20	50
c	b	3	3	20	20
d	a, c	4	2	50	110
e	b, c	3	1	10	70
f	d	5	3	30	70

Learning Rate Coefficients

Unit Number	70%		75%		80%		85%		90%	
	Unit Time	Total Time	Unit Time	Total Time	Unit Time	Total Time	Unit Time	Total Time	Unit Time	Total Time
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	0.700	1.700	0.750	1.750	0.800	1.800	0.850	1.850	0.900	1.900
3	0.568	2.268	0.634	2.384	0.702	2.502	0.773	2.623	0.846	2.746
4	0.490	2.758	0.563	2.946	0.640	3.142	0.723	3.345	0.810	3.556
5	0.437	3.195	0.513	3.459	0.596	3.738	0.686	4.031	0.783	4.339
6	0.398	3.593	0.475	3.934	0.562	4.299	0.657	4.688	0.762	5.101
7	0.367	3.960	0.446	4.380	0.534	4.834	0.634	5.322	0.744	5.845
8	0.343	4.303	0.422	4.802	0.512	5.346	0.614	5.936	0.729	6.574
9	0.323	4.626	0.402	5.204	0.493	5.839	0.597	6.533	0.716	7.290
10	0.306	4.932	0.385	5.589	0.477	6.315	0.583	7.116	0.705	7.994
11	0.291	5.223	0.370	5.958	0.462	6.777	0.570	7.686	0.695	8.689
12	0.278	5.501	0.357	6.315	0.449	7.227	0.558	8.244	0.685	9.374
13	0.267	5.769	0.345	6.660	0.438	7.665	0.548	8.792	0.677	10.052
14	0.257	6.026	0.334	6.994	0.428	8.092	0.539	9.331	0.670	10.721
15	0.248	6.274	0.325	7.319	0.418	8.511	0.530	9.861	0.663	11.384
16	0.240	6.514	0.316	7.635	0.410	8.920	0.522	10.383	0.656	12.040
17	0.233	6.747	0.309	7.944	0.402	9.322	0.515	10.898	0.650	12.690
18	0.226	6.973	0.301	8.245	0.394	9.716	0.508	11.405	0.644	13.334
19	0.220	7.192	0.295	8.540	0.388	10.104	0.501	11.907	0.639	13.974
20	0.214	7.407	0.288	8.828	0.381	10.485	0.495	12.402	0.634	14.608
21	0.209	7.615	0.283	9.111	0.375	10.860	0.490	12.892	0.630	15.237
22	0.204	7.819	0.277	9.388	0.370	11.230	0.484	13.376	0.625	15.862
23	0.199	8.018	0.272	9.660	0.364	11.594	0.479	13.856	0.621	16.483
24	0.195	8.213	0.267	9.928	0.359	11.954	0.475	14.331	0.617	17.100
25	0.191	8.404	0.263	10.191	0.355	12.309	0.470	14.801	0.613	17.713
26	0.187	8.591	0.259	10.449	0.350	12.659	0.466	15.267	0.609	18.323
27	0.183	8.774	0.255	10.704	0.346	13.005	0.462	15.728	0.606	18.929
28	0.180	8.954	0.251	10.955	0.342	13.347	0.458	16.186	0.603	19.531
29	0.177	9.131	0.247	11.202	0.338	13.685	0.454	16.640	0.599	20.131
30	0.174	9.305	0.244	11.446	0.335	14.020	0.450	17.091	0.596	20.727
31	0.171	9.476	0.240	11.686	0.331	14.351	0.447	17.538	0.593	21.320
32	0.168	9.644	0.237	11.924	0.328	14.679	0.444	17.981	0.590	21.911
33	0.165	9.809	0.234	12.158	0.324	15.003	0.441	18.422	0.588	22.498
34	0.163	9.972	0.231	12.389	0.321	15.324	0.437	18.859	0.585	23.084
35	0.160	10.133	0.229	12.618	0.318	15.643	0.434	19.294	0.583	23.666
36	0.158	10.291	0.226	12.844	0.315	15.958	0.432	19.725	0.580	24.246
37	0.156	10.447	0.223	13.067	0.313	16.271	0.429	20.154	0.578	24.824
38	0.154	10.601	0.221	13.288	0.310	16.581	0.426	20.580	0.575	25.399
39	0.152	10.753	0.219	13.507	0.307	16.888	0.424	21.004	0.573	25.972
40	0.150	10.902	0.216	13.723	0.305	17.193	0.421	21.425	0.571	26.543
41	0.148	11.050	0.214	13.937	0.303	17.496	0.419	21.844	0.569	27.111
42	0.146	11.196	0.212	14.149	0.300	17.796	0.416	22.260	0.567	27.678
43	0.144	11.341	0.210	14.359	0.298	18.094	0.414	22.674	0.565	28.243
44	0.143	11.484	0.208	14.567	0.296	18.390	0.412	23.086	0.563	28.805
45	0.141	11.625	0.206	14.773	0.294	18.684	0.410	23.496	0.561	29.366
46	0.139	11.764	0.204	14.977	0.292	18.975	0.408	23.903	0.559	29.925
47	0.138	11.902	0.202	15.180	0.290	19.265	0.405	24.309	0.557	30.482
48	0.136	12.038	0.201	15.380	0.288	19.552	0.403	24.712	0.555	31.037
49	0.135	12.173	0.199	15.579	0.286	19.838	0.402	25.113	0.553	31.590
50	0.134	12.307	0.197	15.776	0.284	20.122	0.400	25.513	0.552	32.142
51	0.132	12.439	0.196	15.972	0.282	20.404	0.398	25.911	0.550	32.692
52	0.131	12.570	0.194	16.166	0.280	20.684	0.396	26.307	0.548	33.241
53	0.130	12.700	0.192	16.358	0.279	20.963	0.394	26.701	0.547	33.787
54	0.128	12.828	0.191	16.549	0.277	21.239	0.392	27.094	0.545	34.333
55	0.127	12.955	0.190	16.739	0.275	21.515	0.391	27.484	0.544	34.877
56	0.126	13.081	0.188	16.927	0.274	21.788	0.389	27.873	0.542	35.419
57	0.125	13.206	0.187	17.114	0.272	22.060	0.388	28.261	0.541	35.960
58	0.124	13.330	0.185	17.299	0.271	22.331	0.386	28.647	0.539	36.499
59	0.123	13.453	0.184	17.483	0.269	22.600	0.384	29.031	0.538	37.037
60	0.122	13.574	0.183	17.666	0.268	22.868	0.383	29.414	0.537	37.574

Learning Rate Coefficients

Unit Number	70%		75%		80%		85%		90%	
	Unit Time	Total Time	Unit Time	Total Time	Unit Time	Total Time	Unit Time	Total Time	Unit Time	Total Time
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	0.700	1.700	0.750	1.750	0.800	1.800	0.850	1.850	0.900	1.900
3	0.568	2.268	0.634	2.384	0.702	2.502	0.773	2.623	0.846	2.746
4	0.490	2.758	0.563	2.946	0.640	3.142	0.723	3.345	0.810	3.556
5	0.437	3.195	0.513	3.459	0.596	3.738	0.686	4.031	0.783	4.339
6	0.398	3.593	0.475	3.934	0.562	4.299	0.657	4.688	0.762	5.101
7	0.367	3.960	0.446	4.380	0.534	4.834	0.634	5.322	0.744	5.845
8	0.343	4.303	0.422	4.802	0.512	5.346	0.614	5.936	0.729	6.574
9	0.323	4.626	0.402	5.204	0.493	5.839	0.597	6.533	0.716	7.290
10	0.306	4.932	0.385	5.589	0.477	6.315	0.583	7.116	0.705	7.994
11	0.291	5.223	0.370	5.958	0.462	6.777	0.570	7.686	0.695	8.689
12	0.278	5.501	0.357	6.315	0.449	7.227	0.558	8.244	0.685	9.374
13	0.267	5.769	0.345	6.660	0.438	7.665	0.548	8.792	0.677	10.052
14	0.257	6.026	0.334	6.994	0.428	8.082	0.539	9.331	0.670	10.721
15	0.248	6.274	0.325	7.319	0.418	8.511	0.530	9.861	0.663	11.384
16	0.240	6.514	0.316	7.635	0.410	8.920	0.522	10.383	0.656	12.040
17	0.233	6.747	0.309	7.944	0.402	9.322	0.515	10.898	0.650	12.690
18	0.226	6.973	0.301	8.245	0.394	9.716	0.508	11.405	0.644	13.334
19	0.220	7.192	0.295	8.540	0.388	10.104	0.501	11.907	0.639	13.974
20	0.214	7.407	0.288	8.828	0.381	10.485	0.495	12.402	0.634	14.608
21	0.209	7.615	0.283	9.111	0.375	10.860	0.490	12.892	0.630	15.237
22	0.204	7.819	0.277	9.388	0.370	11.230	0.484	13.376	0.625	15.862
23	0.199	8.018	0.272	9.660	0.364	11.594	0.479	13.856	0.621	16.483
24	0.195	8.213	0.267	9.928	0.359	11.954	0.475	14.331	0.617	17.100
25	0.191	8.404	0.263	10.191	0.355	12.309	0.470	14.801	0.613	17.713
26	0.187	8.591	0.259	10.449	0.350	12.659	0.466	15.267	0.609	18.323
27	0.183	8.774	0.255	10.704	0.346	13.005	0.462	15.728	0.606	18.929
28	0.180	8.954	0.251	10.955	0.342	13.347	0.458	16.186	0.603	19.531
29	0.177	9.131	0.247	11.202	0.338	13.685	0.454	16.640	0.599	20.131
30	0.174	9.305	0.244	11.446	0.335	14.020	0.450	17.091	0.596	20.727
31	0.171	9.476	0.240	11.686	0.331	14.351	0.447	17.538	0.593	21.320
32	0.168	9.644	0.237	11.924	0.328	14.679	0.444	17.981	0.590	21.911
33	0.165	9.809	0.234	12.158	0.324	15.003	0.441	18.422	0.588	22.498
34	0.163	9.972	0.231	12.388	0.321	15.324	0.437	18.859	0.585	23.084
35	0.160	10.133	0.229	12.618	0.318	15.643	0.434	19.294	0.583	23.666
36	0.158	10.291	0.226	12.844	0.315	15.958	0.432	19.725	0.580	24.246
37	0.156	10.447	0.223	13.067	0.313	16.271	0.429	20.154	0.578	24.824
38	0.154	10.601	0.221	13.288	0.310	16.581	0.426	20.580	0.575	25.399
39	0.152	10.753	0.219	13.507	0.307	16.888	0.424	21.004	0.573	25.972
40	0.150	10.902	0.216	13.723	0.305	17.193	0.421	21.425	0.571	26.543
41	0.148	11.050	0.214	13.937	0.303	17.496	0.419	21.844	0.569	27.111
42	0.146	11.196	0.212	14.149	0.300	17.796	0.416	22.260	0.567	27.678
43	0.144	11.341	0.210	14.359	0.298	18.094	0.414	22.674	0.565	28.243
44	0.143	11.484	0.208	14.567	0.296	18.390	0.412	23.086	0.563	28.805
45	0.141	11.625	0.206	14.773	0.294	18.684	0.410	23.496	0.561	29.366
46	0.139	11.764	0.204	14.977	0.292	18.975	0.408	23.903	0.559	29.925
47	0.138	11.902	0.202	15.180	0.290	19.265	0.405	24.309	0.557	30.482
48	0.136	12.038	0.201	15.380	0.288	19.552	0.403	24.712	0.555	31.037
49	0.135	12.173	0.199	15.579	0.286	19.838	0.402	25.113	0.553	31.590
50	0.134	12.307	0.197	15.776	0.284	20.122	0.400	25.513	0.552	32.142
51	0.132	12.439	0.196	15.972	0.282	20.404	0.398	25.911	0.550	32.692
52	0.131	12.570	0.194	16.166	0.280	20.684	0.396	26.307	0.548	33.241
53	0.130	12.700	0.192	16.358	0.279	20.963	0.394	26.701	0.547	33.787
54	0.128	12.828	0.191	16.549	0.277	21.239	0.392	27.094	0.545	34.333
55	0.127	12.955	0.190	16.739	0.275	21.515	0.391	27.484	0.544	34.877
56	0.126	13.081	0.188	16.927	0.274	21.788	0.389	27.873	0.542	35.419
57	0.125	13.206	0.187	17.114	0.272	22.060	0.388	28.261	0.541	35.960
58	0.124	13.330	0.185	17.299	0.271	22.331	0.386	28.647	0.539	36.499
59	0.123	13.453	0.184	17.483	0.269	22.600	0.384	29.031	0.538	37.037
60	0.122	13.574	0.183	17.666	0.268	22.868	0.383	29.414	0.537	37.574

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