BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, BUET

L-2/T-2 B.Sc. Engineering Examinations 2018-2019

Sub: **ChE 205** (Fluid Mechanics)

Full Marks: 180   Time: 2 Hours

The figures in the margin indicate full marks.

Symbols used have their usual meaning and interpretation.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION-A

There are **THREE** questions in this section. Answer any **TWO**

1. a) Explain briefly the intrinsic relationship among geometric, kinematic and dynamic similarities. Models are to be built of the following prototypes considering dynamic similarity. Indicate which single/multiple dimensionless ratio(s) will govern-

(i) Oil flowing through a partial (cross section) pipeline, (ii) A water jet.

(7+ 3+3 = 13)

b) By dimensional analysis determine the expression for the shear stress at the wall when an incompressible fluid flows in a pipe under pressure. All the significant parameters are to be considered and included in the analysis. **(20)**

c) Summarize the approaches which can be employed for modeling multiphase flow systems. **(12)**

2. a) Demonstrate graphically (with proper sketch and label) the individual effects of specific speed (n_s), rotating speed (n), size (D) and setting arrangement (series and parallel arrangement of identical pumps) on the pump *head vs. capacity* behavior. **(15)**

b) A pump is installed to deliver water from a reservoir of surface elevation zero to another of elevation 90 m. The 30 cm-diameter suction pipe ($f = 0.020$) is 30 m long and the 25 cm-diameter discharge pipe ($f = 0.026$) is 1500 m long. The pump characteristic at 1200 rpm is defined by $h_p = 115 - 9000Q^2$ where h_p, the pump head, is in meters and Q is in m³/s. Compute the rate at which this pump will deliver water under these conditions assuming the setting is low enough to avoid cavitation. **(30)**

3. a) State the application and operating principle of:

(i) Interferometer; (ii) Hot-film Anemometer; (iii) Piezometer Ring. **(4 x 3 = 12)**

b) Write an appropriate technical note on 'Navier-Stokes Equations' **(10)**

c) A Newtonian fluid is in laminar flow in a narrow slit formed by two parallel walls a distance $2B$ apart as shown in figure given below. Consider that $B \ll W$, so that 'edge effects' are unimportant. Also consider that $W \ll L$. Make a differential momentum balance, and prove the following expressions for the momentum-flux and velocity distributions, respectively: **(23)**

Question 3.c) continued
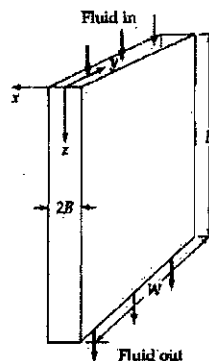
$$\tau_{xz} = \left(\frac{\mathscr{P}_0 - \mathscr{P}_L}{L}\right) x$$

$$v_z = \frac{(\mathscr{P}_0 - \mathscr{P}_L)B^2}{2\mu L}\left[1 - \left(\frac{x}{B}\right)^2\right]$$

SECTION-B

There are **THREE** questions in this section. Answer any **TWO**

4. a) A vessel containing oil under pressure is shown in the Figure 4(a). Find the elevation of the oil surface in the attached piezometer. (5)

Figure for Question No. 4.a)
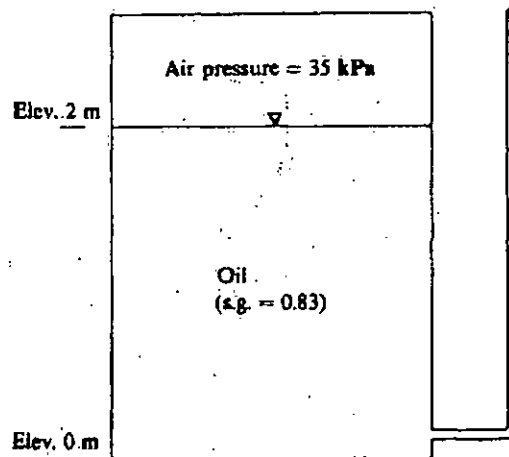
b) Derive and explain Newton's equation of viscosity, $\tau = \mu\frac{du}{dy}$ (15)

c) The gate MN in the Figure 4(c) rotates about an axis through N. If a = 3.3ft, b = 1.3ft, d = 2ft, and the width perpendicular to the plane of the figure is 3ft, what torque applied to the shaft through N is required to hold the gate closed? (25)
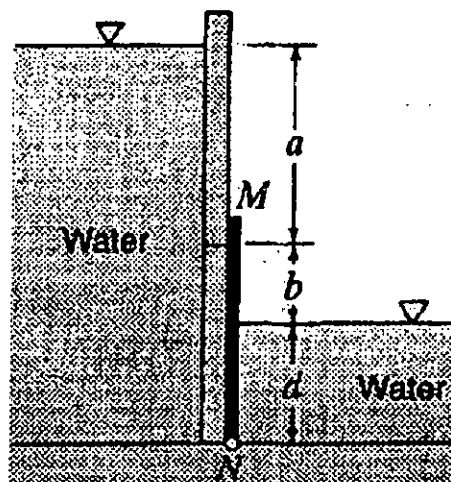

Figure for Question No. 4.c)
Page 2 of 4

5. a) If 140 L/s of water flows through the system shown in Figure 5. a), calculate the total head loss between 2 and 3. (20)
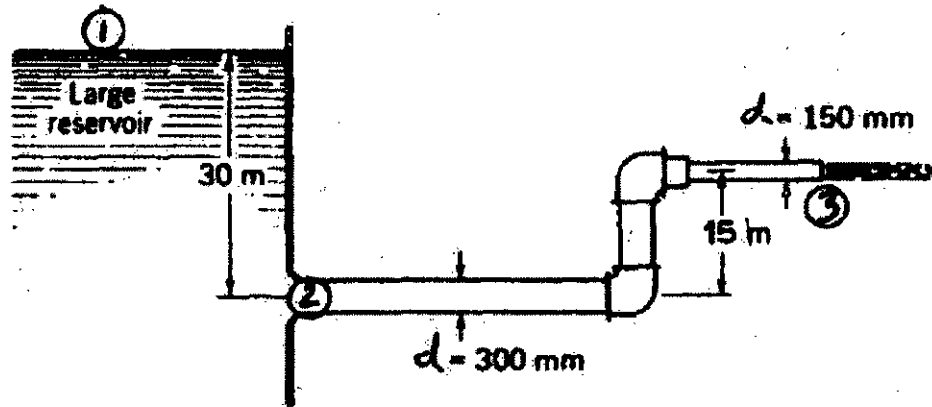
Figure for Question No. 5. a)

b) Pump P, in Figure 5(b) develops 27 ft of head, producing a velocity of flow in pipe C of 5 fps. Neglecting minor losses, find the flow rates in pipes A and B. (25)

The parameters are:

Pipe A – 4200 ft long, 2 ft diameter, $f = 0.03$;

Pipe B – 4200 ft long, 1 ft in diameter, $f = 0.03$;

Pipe C – 4200 ft long, 2 ft in diameter, $f = 0.02$.
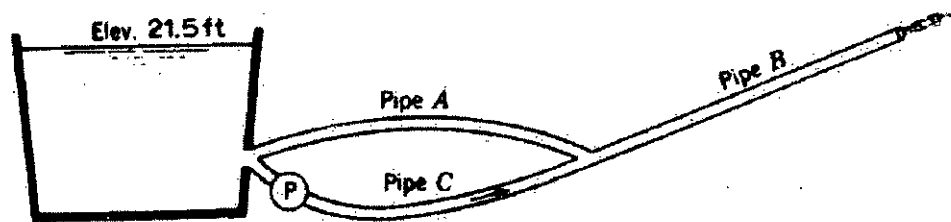
Figure for Question No. 5. b)

6. a) Write short notes on

    i.   Viscous sub-layer in turbulent flow

    ii. Moody diagram

    iii. Hydraulic radius

    iv. Cavitation

(4×5 = 20)

b) A pump is delivering 840 L/min of crude oil (sg = 0.85) from an underground storage drum to the first stage of a processing system (Figure 6. b)).

    i.   If the total energy loss of the system is 4.2 N.m/N of oil flowing, calculate the power delivered by the pump.

    ii. If the energy loss in the suction line is 1.4 N.m/N of oil flowing, calculate the pressure at the pump inlet. (15+10 = 25)
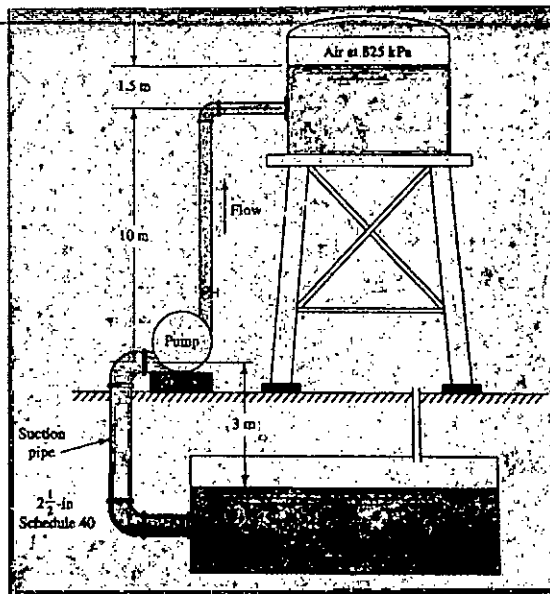
Figure for Question No. 6. b)

Bangladesh University of Engineering and Technology, Dhaka
L--2/T-2, B.Sc Engineering Examinations, January 2020
Subject: CHEM 221 (Organic Chemistry)
Full Marks: 180   Time: 2 Hours + Additional 30 mins for uploading
The figures in the margin indicate full marks
Use separate scripts for each section and upload in the LMS system separately

SECTION- A
(There are **FOUR** questions in the section. Answer any **THREE**)

1.(a) Show with reasons whether the following compounds are aromatic or not.   4×2=8
i)Pyridine   ii) Piperidine   iii) Indole   iv) Cycloheptatriene

(b) Prove that pyrrole is not only a weak base but also a weak acid.   7

(c) How would you bring out the following conversions?   5×3=15
i) Pyrrolidine from pyrrole   ii) 2,3,4,5-Tetraiodopyrrole from pyrrole
iii) Tetrahydrofuran from furan   iv) 2-Iodothiophene from thiophene
v) 2-Lithiumthiophene from thiophene

2.(a) Justify the following statements: 3×3=9
i) Pyridine has a ring structure with five carbons and one nitrogen.
ii) Pyridine exhibits aromatic character
iii) Pyridine contains a tertiary nitrogen

(b) Give the mechanism of obtaining quinoline by Skraup synthesis.   6+5=11
What happens when quinoline is subjected to mild and catalytic reduction?

(c) How furfural undergoes the following reactions?   2×5=10
i) Cannizzaro reaction   ii) Perkin's reaction

3.(a) Illustrate the mechanism of electrophilic substitution of benzene with suitable examples.   9

(b) Polysubstitution of benzene is a very common phenomenon in case of Friedel-Craft's   9
alkylation reaction while polyacylation reaction is a very rare phenomenon in case of
Friedel-Craft's acylation reaction: Justify.

(c) What happens when benzene is treated with the following reagents and reaction   3×4=12
conditions?
i)   Chlorine in presence of sunlight
ii)   Fuming sulphuric acid
iii)   Air in presence of vanadium pentoxide

4.(a) Write down the structures of the following alkaloids and classify them on the basis of   5×2=10
heterocyclic rings present in their structure.
i) Hygrine   ii) Mysomine   iii) Papavarine   iv) Primaquinine   v) Coniine

(b) How the functional nature of oxygen can be identified in the structure of   12
alkaloids.

(c) How will you prove that the alkaloid coniine contains a pyridine nucleus with a side   8
chain at C-2 position ?

(There are **FOUR** questions in this section. Answer any **THREE**)

5a. Draw all possible isomeric structures of the hydrocarbons having molecular formula C_5H_{12}. 8
Identify the primary, secondary and tertiary hydrogen atoms in these structures. Name each of them according to the IUPAC system.

b. What are the two possible structures of A (C_6H_{12}) when it shows the following results: 10
(i) (A) + $Br_2/CCl_4 \rightarrow$ Colorless solution
(ii) (A) + Dil. cold $KMnO_4 \rightarrow$ Brown precipitation
(iii) (A) + O_3 followed by treatment with Zn/CH_3COOH or dimethyl sulfide gives CH_3CH_2CHO as the only product.

c. How will you prepare 2,2-dimethylpropane by Corey-House synthesis? Give the mechanism. 12

6.a Which one of the following ring compounds is the most stable? Explain in favor of your 8
choice.
Cyclopentane, Cyclopropane, Cyclobutene, Cyclohexane

b. Write structural formulas for the two chair conformations of cis-1-isopropyl-4- 10
methylcyclohexane. Are these two conformations equivalent? If not, which would be more stable? Which would be the preferred conformation at equilibrium?

c. What would be the major product when dehydrohalogenation of 2-bromo-2-methylbutane is 12
carried out with potassium tert-butoxide in tert-butyl alcohol? Give the mechanism.

7a. Although ethyl bromide and isobutyl bromide are both primary halides, ethyl bromide 12
undergoes S_N^2 reactions more than 10 times faster than isobutyl bromide does. When each compound is treated with a strong base/nucleophile (EtO⁻), isobutyl bromide gives a greater yield of elimination products than substitution products, whereas with ethyl bromide this behavior is reversed. Give the reactions. What factor accounts for these results?

b. What experimental conditions would you choose to ensure that elimination is favored over 12
substitution for the conversion of tert-butyl chloride to 2-methylpropene?

c. Write the enantiomeric forms of bromochlorofluoromethane and assign each enantiomer with 6
(R) or (S) designation.

8a. What stereoisomers would be obtained from hydroboration–oxidation of the following 10
compounds?
a) cyclohexene b) 1,2-dimethylcyclopentene c) 1-ethylcyclohexene d) cis-2-butene

b. Identify the three products that are formed when 2-bromo-2-methylpropane is dissolved in a 20
mixture of 80% ethanol and 20% water. Discuss the mechanisms.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA
L-2/T-2   B. Sc. Engineering Examinations 2018-2019
Sub: **MATH 223** (Numerical Analysis and Statistics)
Full Marks: 180   Time: 2 Hours
USE SEPARATE SCRIPTS FOR EACH SECTION
The figures in the margin indicate full marks.
Symbols used have their usual meaning.

SECTION-A

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

1. (a) Discuss Newton-Raphson method for the solution of $f(x) = 0$. Use Newton- **(15)** Raphson method to find solution of the equation $e^x + 2^{-x} + 2\cos x - 6 = 0$ for $1 \le x \le 2$ accurate to within 10^{-5}.

    (b) Use simple fixed-point iteration to locate the root of $f(x) = \sin(\sqrt{x}) - x$. Use an initial guess of $x_0 = 0.5$ and iterate until the error estimator $\varepsilon_a \le 0.01\%$. **(15)**

2. (a) Use the numbers $x_0 = 2$, $x_1 = 2.75$ and $x_2 = 4$ to find the second Lagrange **(15)** interpolating polynomial for $f(x) = 1/x$. Then use this polynomial to approximate $f(3) = 1/3$.

    (b) Use the Newton's forward-difference formula to construct interpolating **(15)** polynomials of degree one, two and three for the following data. Approximate the value of $f(0.25)$ using the polynomial.

    $f(0.1) = -0.62049958$, $f(0.2) = -0.28398668$, $f(0.3) = 0.00660095$, $f(0.4) = 0.24842440$.

3. (a) Find the first and second derivative of $f(x)$ at $x = 51$ from the following data: **(15)**

x :	50	60	70	80	90
$f(x)$:	19.96	36.65	58.81	77.21	94.61

    (b) Derive general quadrature formula for equidistant ordinates and hence find **(15)** Simpson's 1/3 rule as well as Simpson's 3/8 rule.

4. Evaluate $\int_{-2}^{2} \dfrac{t}{5+2t}\, dt$ with $h = 0.5$ by using (i) Trapezoidal rule (ii) Simpson's 1/3 rule. Also compare the result with exact value of integral. **(30)**

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

5. (a) Solve $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 0$ by Picard's method up to the third approximation. **(15)** Hence find the value of $y(0.2)$.

(b) Using Runge-Kutta method of 4th order, solve the differential equation **(15)** $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$. Hence find the value of $y(0.4)$ taking $h = 0.4$.

6. (a) An analysis of workers resulted in the following distribution: **(20)**

Earnings (Tk)	50-70	70-90	90-110	110-130	130-150	150-170	170-190
No. of Employees	4	8	12	20	6	7	3

Calculate the first four moments about assumed mean. Convert the result into moments about the mean. Using moments calculate the coefficient of skewness and kurtosis and comment on the result obtained.

(b) From a box containing 4 black balls and 2 green balls, 3 balls are drawn in succession, **(10)** each ball being replaced in the box before the next draw is made. Find the probability distribution for the number of green balls.

7. (a) Each sample of water has a 15% chance of containing a particular organic pollutant. **(18)** Assume that the samples are independent with regard to the presence of the pollutant.

    i.   Find the probability that in the next 18 samples, exactly 3 contain the pollutant.

    ii.   Determine the probability that at least four samples contain the pollutant.

    iii.   If x is the number of samples that contain the pollutant, then determine the probability that $3 \le x < 7$.

(b) The IQs of 500 applicants to a certain college are approximately normally distributed **(12)** with a mean of 110 and a standard deviation of 15. Note that IQs are recorded to the nearest integers. If the college requires an IQ of at least 95, how many of these students will be rejected on this basis of IQ, regardless of their other qualifications? (Necessary table attached)

8. (a) To study the tensile strength of a certain type of wire, the following pairs of **(15)** observations were recorded, where x is the diameter in cm and y is the mass supported in kg/cm.

x	0.6	0.8	1.0	1.2	1.4	1.6
y	14	26	50	56	42	98

    i.   Fit a linear regression model Y on X.

    ii.   Is the linear model appropriate for given data, justify your result using

coefficient of determination?

(b) A random sample of 100 recorded deaths in the United States during the past year (15) showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance. (Necessary table attached)

Table Areas under the Normal Curve

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

t-test table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
						Confidence Level					

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-2 B.Sc. Engineering Examination, January 2020

Sub: **HUM 103** (Economics)

Full Marks: 180   Time 2 Hours

The Figures in the margin indicate full marks

. USE SEPARATE SCRIPTS FOR EACH SECTION

There are 3 page(s) in this question paper.

SECTION – A

There are FOUR questions in this section. Answer any THREE

All the symbols have their usual meanings·

Assume reasonable values for missing data.

1. (a) From the following demand function, make a hypothetical demand schedule   (15)
    and plot the curve.
    $$Q = 100 - 20P + P^2.$$

    (b) What are the factors that influence the shifting of the supply curve? Explain.   (15)

2. (a) How would you measure price elasticity of demand at any point of a straight   (15)
    line demand curve? Explain graphically.

    (b) From the following table calculate elasticity of demand if you move from   (15)
    point B to C and explain what you understand from the result.

POINT	Px	Qy
A	550	120
B	750	150
C	950	180

3. (a) What is an indifference curve? Explain the properties of an indifference   (15)
    curve.

(b)) From the following budget line and the utility function, calculate the (15) amount of two commodities that maximizes satisfaction. What is the maximum amount of satisfaction?

$$4000 = 35X + 45Y$$
$$U = 500\ X^{0.6}Y^{0.7}$$

4   (a) How is price determined in an economy Under competition? What will (15) happen to the price and quantity due to simultaneous change in demand and supply?

(b) From the following demand and supply functions, calculate equilibrium (15) price and quantity and show the result in a graph.
$$P = 0.20\ Q + 10$$
$$P = -0.10Q + 40$$

   i)   What will happen to the equilibrium price and quantity if government imposes a unit tax of TK 10 per unit?
   ii)   What will happen to the equilibrium price and quantity if government gives a subsidy of TK 20 per unit?
   iii) Describe the change in equilibrium. Show the equilibrium coordinates on the same graph.

SECTION – B

There are FOUR questions in this section. Answer any THREE

5.   (a) What are the major concerns of Macroeconomics? What tools are used to (15) achieve macroeconomic objectives?

(b) What is aggregate demand? What is aggregate supply? How is the (15) equilibrium established in macroeconomics? Explain.

6.   (a) What is GDP? Distinguish between Nominal GDP and Real GDP.   (15)

     (b) What are the different approaches of measuring national products of a (15) country? Why are these approaches found equivalent?

7.   (a) What is inflation? What are the causes of inflation? What are the   (15) consequences of inflation?

     (b) What does the simple quantity theory of money predict about the impact of   (15) money supply on the economy's price level? Explain.

8.   (a) Using hypothetical numbers, explain the money creation process of the   (15) commercial banks. How does money multiplier set a maximum ceiling for the creation of money by the commercial banks?

     (b) What are the tools that central banks use to control money supply in the   (15) economy? How do these tools work?