WATER RESOURCES ENGINEERING

ASSIGNMENT-1

DEADLINE: DAY OF MIDTERM 1

Student ID	060410**ba**
If *b* or/and ***a*** is 0 take **5 to use in solving problems below.**	

Question 1. Write the characteristic properties of non-cohesive materials.

Question 2. Classify sediments (solid particles) transported by river. Give brief explanation.

Question 3. Find the total amount of suspended sediment per unit width of a river according to the velocity profile and suspended sediment concentration given in the following table.

Depth (m)	0.05	0.5	1.0	1.5	2.0	2.2
Velocity (m/s)	1.2a	1.5b	1.7b	1.4a	0.7a	0.3a
Concentration($m^3/10^6m^3$)	11a	11b	21a	31b	41a	61a

Question 4. A river conveys **7a** m^3/s flowrate observed 150 days in a year. The river bed slope, hydraulic radius and base width of the river are 0.006m/m, 0.85 m, and **5b** m, respectively. The critical shear stress and parameter of rolling and traction is given as **0.2a** kg/m^2, ψ=0.5 $m^3/(kg\ s)$. According to given information, find the rate of the rolling and traction load and annual total amount of the load.

Question 5. Flowrate in a rectangular channel is **18a** m^3/s. Water depth, base width of the channel, bed slope, mean particle diameter, specific weight, and kinematic viscosity are **3.b** m, **3a** m, 0.003m/m, $8x10^{-4}$, 2650 kg/m^3, $1x10^{-6}$ m^2/s, respectively (Assume channel is wide enough). Determine the amount of rolling and traction load using Schoklitsch, Meyer-Peter Müller and Einstein-Brown formulas.

Question 6. Explain the river contraction structures with drawing schematic views.

Question 7. Draw the schematic view of cut-off channel and discuss effects of cut-off channels on river.

Question 8. Write the general equation used for the determination of flood mitigation. Explain how it changes during a flood.

Question 9. River training with embankments (or levees) for flood control is planned. The width of the river bed and water depth for the main channel are given as 25 m and **4.a,** respectively. The width and depth of the flood plain are **10a** m and **1.5b** m, respectively. Water surface slope before and after the training is 0.004m/m. The manning roughness coefficients for main channel $n_{main\ channrel}$= **0.03b,** for flood plain $n_{flood\ plain}$= 0.045.

a) Determine the increase of the water depth if the width of the flood plain decreases **6a** m with embankments.
b) Find required width of the flood plains if the maximum water depth increment is only **0.4b** m after the construction of embankments.

Question 10. A triangular shape of a flood hydrograph is given in the following table. The net width of spillway and spillway coefficient are **3a** m and **2.3b,** respectively. The rating curve equation is given as a function of spillway head ($\boldsymbol{V=3x10^6xH^{0.5}}$). Consider the reservoir is full at the beginning of the flood. Find the maximum spillway head, spillway discharge and amount of water retained at the reservoir.

Hours	2	4	6	8	10	12
Q (m^3/sec)	140	280	210	140	70	0

Question 11. Constant incoming flowrate to a flood detention dam is 10 m^3/s. The length and diameter of bottom outlet are 80 m and **1.a** m, respectively. The reservoir surfaces areas obtained from the area-elevation curve are given the following Table. Determine the time which is needed to raise water level from 6 m to 8 m.

h(m)	6.0	6.5	7.0	7.5	8.0
A(m^2)	95ab	104ab	112ba	121ba	142ba

Question 12. River training is going to be planned for 1000 m length of river course with sills that decreases the bed slope from 0.0015 to 0.00006**.** Top width of the rectangular river channel of **30b** m that is to convey **15ab** m^3/s discharge. The water depth is **3.a** meter. Determine the height of the sill over which normal water depth is 1.5 times of the critical depth.