٢٠١٦/١/٢٧ ٢ فرني

Tanta University	Department: **Civil Engineering** Total Marks: **85 Marks**	Faculty of Engineering
Course Title: **Design of Reinforced Concrete Structures (1) a**	Course Code: **CSE2105**	**2nd year**
Date: **January 27th 2016 (First term exam)**	Allowed time: **4 hrs**	**No. of Pages: (3)**

- *Any missing data may be reasonably assumed.*
- *Concrete characteristic strength for all reinforced concrete members, f_{cu} = 25 N/mm^2.*
- *Grade of reinforcing steel is 360/520 for main steel and 240/350 for stirrups.*

غير مسموح باصطحاب أى جداول أو مساعدات تصميم بخلاف المُسلّمة فى لجنة الإمتحان.

Question No. (1) **(15 Marks)**

Choose the correct answer:

1) *The secant modulus of elasticity of concrete is the slope of line drawn from the origin to a point on the stress-strain curve somewhere between:* ***(1.5 Marks)***
   - a- *25% and 50% of its ultimate compressive stress.*
   - b- *50% and 75% of its ultimate compressive stress.*
   - c- *75% and 100% of its ultimate compressive stress.*
2) *Limit state design method takes factor of safety in:* ***(1.5 Marks)***
   - a- *loads.*
   - b- *stresses.*
   - c- *both of (a) and (b).*
3) *Bernoulli's hypothesis that plane sections before bending remain plane and perpendicular to the neutral axis after bending is applicable for:* ***(1.5 Marks)***
   - a- *RC shallow beams.*
   - b- *RC deep beams.*
   - c- *both of (a) and (b).*
4) *According to Egyptian code ECP203-2007, the stress distribution diagram referred to as "the stress block" takes an actual second-degree parabola up to a strain equals:* ***(1.5 Marks)***
   - a- *0.002.*
   - b- *0.003.*
   - c- *0.004.*
5) *The Egyptian code ECP203-2007 states that for a simply supported beam:* ***(1.5 Marks)***
   - a- *at least 1/2 of the positive moment reinforcement must be continued to the support.*
   - b- *at least 1/3 of the positive moment reinforcement must be continued to the support.*
   - c- *at least 1/4 of the positive moment reinforcement must be continued to the support.*
6) *Under reinforced section is characterized by:* ***(1.5 Marks)***
   - a- *crushing of concrete followed by yielding of main steel.*
   - b- *yielding of main steel followed by crushing of concrete.*
   - c- *yielding of main steel not followed by crushing of concrete.*
7) *In the vicinity of mid-span of a uniformly loaded simply supported beam where shear is small and bending stress is large; the direction of principal tensile stress is nearly:* ***(1.5 Marks)***
   - a- *horizontal.*
   - b- *vertical.*
   - c- *inclined.*
8) *Near the support of a uniformly loaded simply supported beam, the shearing force is large and bending stress is small so, if the beam is overloaded the diagonal tension crack starts to appear at:* ***(1.5 Marks)***
   - a- *the top fiber of the beam section.*
   - b- *the bottom fiber of the beam section.*
   - c- *the center of the beam section.*
9) *In case where the reaction exerts tension to a member, the critical section of ultimate nominal shear stress will be:* ***(1.5 Marks)***
   - a- *at the face of the support.*
   - b- *at a distance of d/2 from the face of the support.*
   - c- *at a distance of d from the face of the support.*

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10) *The Egyptian code ECP203-2007 states that the design shear stress should not exceed the maximum shear stress "q_{umax}" to:* ***(1.5 Marks)***

a- avoid yielding of stirrups.
b- avoid concrete crushing.
c- none of (a) and (b).

Question No. (2) (24 Marks)

a) *For the cross section of a multi cell box girder bridge shown in figure (1);* ***using the first principles****, find:*

1. *The cracking moment (M_{cr}).* ***(4 Marks)***
2. *The allowable moment (M_{all}).* ***(4 Marks)***
3. *The nominal moment (M_n).* ***(4 Marks)***

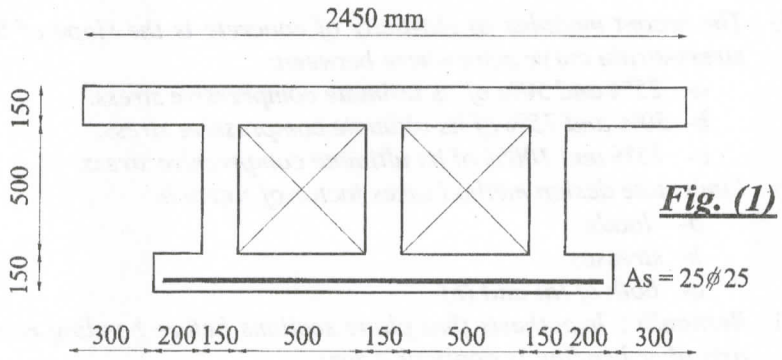

Fig. (1)

b) *For the simply supported beam with a rectangular cross section 250 x 600 mm shown in figure (2), it's required to:*

1. ***Using first principals,*** *design the beam for the given loads* ***neglect the own weight.*** ***(4.0 Mark)***
2. *Calculate the lengths L_1, L_2 and L_3 according to the Egyptian code ECP203-2007.* ***(4.0 Mark)***
3. *For architectural reasons, the total depth is limited to 450 mm, redesign the beam to accommodate the same moment without exceeding the given depth limit* ***using first principals****.* ***(4.0 Mark)***

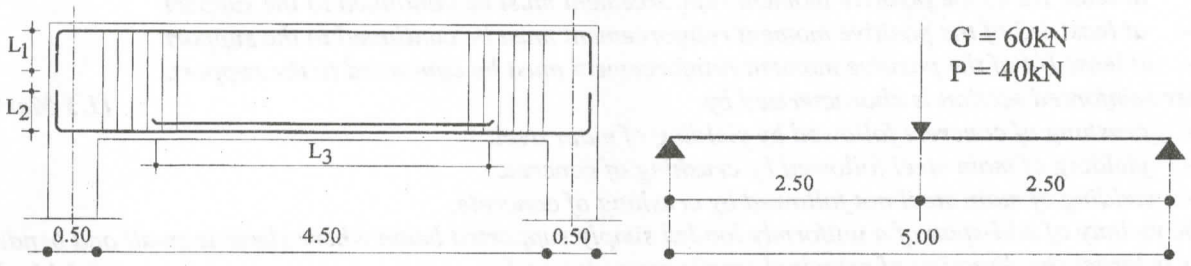

Fig. (2)

Question No. (3) (46 Marks)

Clear drawings are greatly considered*.*

For the part of the architectural plan of an office building shown in figure (3); it is required to:

1. *Choose and draw a suitable statical system.* ***(2.5 Marks)***
2. *Draw the load distribution of slabs on the structural plan.* ***(2.5 Marks)***
3. *Calculate load on beam on axis (4-4).* ***(6.5 Marks)***
4. *Draw with a suitable scale the S.F.D and B.M.D due to* ***ultimate total loads only****.* ***(4.0 Marks)***
5. *Design critical sections of that beam for* ***flexure and shear for the case of total loads only****.* ***(8.0 Marks)***

Tanta University
Faculty of Engineering
Irrigation and Hydraulics Engineering Department
Examination (Second Year) Students of Civil Engineering

Course Title: Hydrology			Course code: CIH2103
Date: 20. January,2016	Final First Term Exam	Total Marks: 85 Marks	Time allowed: 3 Hours

Notes:
Answer as many questions as you can.
Systematic arrangement of calculations and clear neat drawings are essential.

الإمتحان مكون من 4 أسئلة وفى أربع صفحات

Question 1: (25 marks)

A. Clearly Define the Following Terms:

i. Water cycle **(3 marks)**

ii. Water Budget **(3 marks)**

B. What are the driving forces affect water scarcity in Egypt? **(3 marks)**

C. Draw with all detail the instruments that used to measure rainfall depth. **(3 marks)**

D. A river basin has the area in the form shown in **Figure 1**. The raingauge stations A, B, C, D, E, and F located at the corners and the center, have records ***124, 98, 130, 145, 89,*** and ***108*** mm of rainfall respectively. ***It required to:***

i. Determine the average depth of rainfall using thiessen polygon and arithmetic mean methods. **(6 marks)**

ii. Calculate the percentage accuracy of the existing network in the estimation of the average depth of rainfall over the basin. **(3 marks)**

iii. What do you suggest to optimize the percentage accuracy you calculated? **(2 marks)**

Question 2: (20 marks)

A. The following meteorological data pertain to a large reservoir with a water spread area of 70 km^2. The data represents the average values for the day.

- Water temperature = 25 C° Air temperature = 26.5C°
- Atmospheric pressure = 752 mm of mercury
- Wind speed at 0.7 m above ground level = 32.5 km/h

Estimate the average daily evaporation from the reservoir and also the losses from the reservoir for a period of one year using *Meyer's equation and Rohwer's equation.* **(6 marks)**

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B. Use the Green-Ampt equation to evaluate the infiltration rate and cumulative infiltration depth for a Silty Clay Loam soil at 0.2 hr increments for the first hour and the 0.5 hr increments for six additional hours. The initial effective saturation is 25 percent and assume ponding. **(7 marks)**

C. The data obtained during a stream gauging using a current meter with a rating v= 0.047+0.77N is given in **Table 3**. The velocity is measured at 0.4 times the depth of flow from the streambed. Compute the discharge using the mid-section method. **(7 marks)**

Question 3: (18 marks)

A. What are the methods of estimating runoff from a catchment? **(3 marks)**

B. Describe three methods of separating the baseflow from the total runoff **(3 marks)**

C. **Table 1** presents the rainfall excess hyetograph and the 1-hr UH of a catchment area. Derive the storm hydrograph ***using the discrete convolution equation***, then plot the storm hydrograph and the 1-hr UH on the same figure. (Assume no losses to infiltration or evapotranspiration). **(8 marks)**

D. It required to convert the 1-hr unit hydrograph (UH) given in **Table** 4, to a 3-hr UH. **(4 marks)**

Question 4: (24 marks)

A. Briefly describe the hydrology of the Nile River. **(3 marks)**

B. **Table** 5 presents the monthly inflow of a river during one year. It is required to find the required storage of the reservoir to satisfy demand requirements of 48 m^3/s. use graphical and analytical methods. **(10 marks)**

C. **Table 2** presents the concurrent observations on monthly inflow (m^3) in two tributary of a river for a period of 10 months.

i. Calculate the statistical properties of the two stations. **(3 marks)**

ii. Calculate the correlation coefficient between the two stations. **(5 marks)**

iii. If the observed precipitation at station A equals 112.23mm, compute the value of B based on A using the regression analysis. **(3 marks)**

Best Wishes - Dr. Mosaad Khadr & the Committee

Table 1

Time (hr)	0	1	2	3	4	5	6	7	8	9	10	11	12
Net Rainfall (in)		0.6	1.10	1.70	0	0.5							
1-hr UH (cfs)	0	120	295	384	430	520	574	475	374	315	180	110	0

Table 2

Month	1	2	3	4	5	6	7	8	9	10
Station A	106	115	126	110	108	110	111	107	104	105
Station B	130	142	125	120	122	125	125	121	118	118

Table 3

Distance from bank in m	0	2	4	6	8	10	12	14	16
Depth, m	0	1.3	2.3	4.5	8.6	4.2	2.6	1.4	0
Revolutions	-	15	48	52	68	42	39	17	-
Time , s	-	44	46	62	69	67	51	46	-

Table 4

Time (hr)	0	1	2	3	4	5	6	7	8
1-hr UH (cfs)	0	28	58	115	92	69	46	23	0

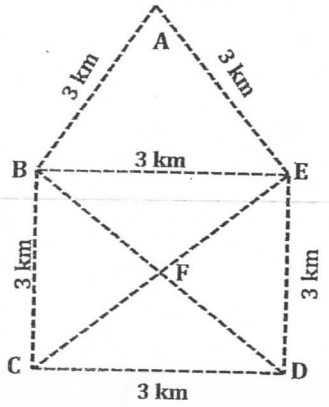

Figure 1

Table 5

Month	Inflow m^3/s
1	72
2	54
3	42
4	30
5	18
6	26
7	60
8	96
9	126
10	108
11	96
12	84

Some Equations that may be used

Relation between Saturated Vapor Pressure & Temperature

T (C°)	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00
e_s (mb)	23.34	24.82	26.39	28.04	29.77	31.61	33.54	35.57	37.71	39.95

Texture	Porosity n	Residual Porosity Θ_r	Effective Porosity Θ_e	Suction Head ψ (cm)	Conductivity K (cm/hr)
Silt Loam	0.501	0.015	0.486	16.68	0.65
Sandy Clay Loam	0.398	0.068	0.330	21.85	0.15

$n = \theta_i + \Delta\theta$

$E = K(e_w - e_a)$

$E_L = k_m (e_w - e_a)(1 + V_{10}/16)$

$E_L = 0.771\,(1.465 - 0.000732\,P_a)(0.44 + 0.0733\,V_o)(e_w - e_a)$

$E_L = 0.0331\,V(e_w - e_a)(1 - 0.03(T_a - T_w))$

$PET = 2.54\,K\,F$

$$r_{XY} = \frac{\sum_{i=1}^{N}\left(\frac{X_i - \bar{X}}{S_X}\right)\left(\frac{Y_i - \bar{Y}}{S_Y}\right)}{N-1}$$

$b_0 = \bar{y} - b_1\bar{x}$

$f(t) = f_c + (f_0 - f_c)e^{-kt}$

$F(t) = f_c t + \frac{f_o - f_c}{k}(1 - e^{-kt})$

$\Delta\theta = (1 - s_e)\,\theta_e$

$f(t) = K\left(1 + \frac{\psi\Delta\theta}{F(t)}\right)$

$F = Kt + \Delta\theta\psi_f \ln\left(1 + \frac{F}{\Delta\theta\psi_f}\right)$

$S_X = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(X_i - \bar{X})^2}$

$F = \Sigma\, P_h\, T_f / 100$

°C x 9/5 + 32 = °F

$$s_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

$b_1 = \frac{s_{xy}}{s_x^2}$