Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019
Course Code: CE 302
Course Name: DESIGN OF HYDRAULIC STRUCTURES

Max. Marks: 100   Duration: 4 Hours

Use of Khosla's chart, Blench curve and Montague curve are permitted in the exam hall

PART A
Answer any two full questions, each carries 15 marks.

Marks

1   a)   Explain the failure of hydraulic structures by sub surface flow.   (4)

    b)   Compare Kennedy's theory and Lacey's silt theory.   (5)

    c)   Explain the different types of weir with neat sketches.   (6)

2   a)   What are the functions of an under sluice and silt excluder in a diversion headwork?   (4)

    b)   Explain the different classifications of canal.   (5)

    c)   Write down the procedure for the design of a vertical drop weir.   (6)

3   a) Draw the section of unlined canal partly in cutting and partly in filling and explain the parts   (5)

    b)   Two sheet piles of unequal length are provided at the two ends of an impervious floor of 15m length and 1m thick. Total head created on the floor is 3m. Using Khosla's method of independent variables, calculate the uplift pressure at the key points, if the upstream pile is 3m deep and downstream pile is 5m deep.   (10)

PART B
Answer any one full question, each carries 50 marks.

4   a)   Design a suitable cross drainage work for the following hydraulic particulars: (25)

       Discharge of the canal = 28 cumecs

       Bed width of the canal = 20m

       Depth of water in the canal = 1.6m

       Bed level of canal = 250.00m

       High flood discharge of the drainage = 400 cumecs

       High flood level of drainage = 253.00m

       Bed level of drainage = 248.00m

General ground level = 250.00m

b) Prepare the following drawings (not to scale) (25)

    i.   Half plan at top and half at the foundation level.

    ii.   Longitudinal section along drain.

5   a) Design a 1.2m Sarda type fall for the following data. (25)

    Full supply discharge through the canal = 35 cumecs.

    Bed level at u/s = 110.00m

    Full supply depth at u/s = 1.60m

    Bed width u/s and d/s = 26.0m

    Safe exit gradient = 1/5

    Impervious floor design is to be carried out as per Khosla's theory.

b) Prepare the following drawings (not to scale) (25)

    i.   Half plan at top and half at the foundation level.

    ii.   Section through the centre line of the canal.

PART C
Answer any two full questions, each carries 10 marks.

6   a)   Derive the most economical central angle of an arch dam. (4)

    b)   Obtain the condition for no-tension criteria in a gravity dam. (3)

    c)   Distinguish between a low dam and a high dam (3)

7   a)   Write a brief note on joints in gravity dam. (4)

    b)   Explain chute spillway and side channel spillway. (4)

    c)   Draw the cross-sections of the zoned earth dam you would select if the materials available are gravel and clayey silt.

8   Check the stability of the gravity dam for the following data. Top width = 5m, freeboard = 3m, u/s FRL depth = 60m, u/s batter =1/10, d/s slope = 0.7H to 1V, u/s remains vertical to a depth of 12m from top. There is no tail water and silt.

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
Course Code: CE304
Course Name: DESIGN OF CONCRETE STRUCTURES - II

Max. Marks: 100   Duration: 3 Hours

Use of IS 456, IS 875, IS 1343, IS 3370 , SP 34 and SP 16 are permitted.
Assume any missing data suitably,.
PART A
Answer any two full questions, each carries 15 marks.

Marks

1   a)   Design a RCC rectangular column to carry an axial load of 1200 kN and a moment of 70 kNm, The length of the column is 3.5m. The one end is fixed and the other end is hinged. The width of the column is restricted to the wall thickness of 24 cm.   (10)

    b)   Discuss the analysis of a trapezoidal combined footing and sketch the plan and elevation.   (5)

2   a)   Design a slender braced circular column under uniaxial bending with the following
data:
Size of column = 40 cm
Concrete grade = M20
Steel grade = Fe 415
Effective length ratio = 0.85
Unsupported length = 7m
Factored load Pu = 1000 kN
Factored Moment Mux = 60kNm at Top
                             = 30 kNm at Bottom   15

3   a)   Design and detail an isolated footing for a square column 400 mm x 400 mm carrying a load of 2100 kN. The SBC of the soil is 280 kN/m^2.Use M20 concrete and Fe 415 grade steel   15

PART B
Answer any two full questions, each carries 15 marks.

4   a)   A cantilever retaining wall is designed to retain earth for a height of 4 m. Assume good soil for foundation is at a depth of 1m below the ground level. The safe bearing capacity of soil is 180 kN/m^2 and unit weight of soil is 16.5 kN/m^3. Coefficient of friction between soil and concrete is 0.5 and angle of shearing resistance of 30°. Proportion the retaining wall and check for stability. Also design and detail the stem slab and toe slab of the retaining wall.   (15)

5   a)   Explain the different types of retaining wall. Discuss the design procedure in detail of a counterfort retaining wall. Also sketch the reinforcement detail   (10)

b)   Briefly explain the use and design of ring beam in dome structure.   5

6   a)   A circular slab is 6 m diameter and is simply supported at the edges. It is loaded   15
with a live load of 4 kN/m^2. Design the reinforcement for the slab and sketch the
details. Assume M 20 concrete and Fe 415 steel.

PART C
Answer any two full questions, each carries20 marks.

7   a) Design and detail a circular tank with fixed base for a capacity of 6 lakh litres.   (20)

The depth of water is to be 5m including freeboard of 250mm. The tank is

supported on ground. Design using M20 concrete and 415 grade steel.

8   a)   Differentiate between pre-tensioning and post-tensioning.   (5)

b)   Determine the extreme fibre stresses developed at the mid span section of a   15
simply supported prestressed concrete beam of rectangular section 250 mm x
600 mm prestressed using high tensile steel of cross sectional area 1000 mm^2
stressed to 1500 N/mm^2. The center of gravity of the steel is 150 mm above the
soffit of the beam. The superimposed load is 16kN/m . Span of the beam is 12 m
.Draw the stress diagram at mid span.

9   a)   Explain the various losses of prestress.   5

b)   A prestressed concrete beam 250mm wide and 350 mm deep is prestressed by 12

1

5 wires of 6mm diameter located at an eccentricity of 40 mm and carrying a initial
stress of 1500 N/mm^2. The span of the beam is 8m. Calculate the percentage of
losses in wires if it is pretensioned Es =210 KPa and Ec = 35 Kpa, relaxation of
steel stress = 5% of the initial stress, total shrinkage strain is 200×10^{-6}.
■■■

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE306
Course Name: COMPUTER PROGRAMMING AND COMPUTATIONAL
TECHNIQUES

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.   Marks

1 a) Write short notes on usage of Preprocessor directives in C++   (4)

   b) What are manipulators in C++. Explain with suitable examples.   (4)

   c) Write a program to accept the height of a person in centimetres and convert and   (7)
       display the height in feet and inches

2 a) Explain in detail the use of *break* and *continue* statements in C++ with suitable   (7)
       examples.

   b) Write a program to read a 2D array of size m x n and prepare a 1 D array that   (8)
       will store all the elements of the 2D array as if they were stored in the row major
       form.

       Sample: if the 2 D array is $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ the 1 D array having the elements of 2D

       array in row major form is $\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \end{bmatrix}$

3 a) Explain any four string handling functions.   (8)

   b) Write a program to check whether a given character is a vowel, using switch   (7)
       statement.

PART B
Answer any two full questions, each carries 15 marks.

4 a) Explain the call by value and call by reference methods of function invoking.   (5)

   b) Write a program using functions to find the largest and smallest number in a 2D   (10)
       array. Note: The function should accept the 2D array from the main function and
       return the maximum and minimum number.

5 a) Write and explain the general form of a structure definition, declaration &   (7)
       initialisation with proper examples.

b) Write a program (using structure) to read the details of m students in a class (8) including Roll no., name and marks of **3** subjects and print average mark of each student.

6 a) Explain the various file input and output streams commonly used in C++? (7)

   b) Bring out the difference between procedure oriented programming and object (8) oriented programming

PART C
Answer any two full questions, each carries20 marks.

7 a) Using method of successive approximations find a real root of the equation (10)
   $x - sinx - {}^1\!/_2 = 0$. For iteration the trial value of root may be taken as 1.0.

   b) Develop a program to fit a straight line to a given set of coordinates. (10)

8 a) The following table gives the results of the measurements of resistance felt by a running train, where *V* the velocity of travel in km/hr and *R* is the resistance in kN.

V	20	40	60	80	100	120
R	5.5	9.1	14.9	22.8	33.3	46

   Develop a 2nd degree polynomial (parabola) relationship connecting *R* and *V* using the method of least squares.

   b) Write a program to perform numerical integration using Trapezoidal rule when the function is tabulated as data points.

9 a) Solve the following simultaneous system of equations using Gauss elimination method.
   $3x_1 - 0.1x_2 - 0.2 x_3 = 7.85$;

   $0.1 x_1 + 7 x_2 - 0.3 x_3 = -19.3;\ \ 0.3 x_1 - 0.2 x_2 + 10 x_3 = 71.4$.

   b) Demonstrate the finite difference method of numerical solution of partial differential equations for the case of a Laplace equation given by $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial v^2} = 0$

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE308
Course Name: TRANSPORTATION ENGINEERING - I

Max. Marks: 100 Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.

Marks

1 a) Explain briefly the classification of highways by Nagpur Road Plan. How is this system of classification modified as per the Third Twenty Year Road Development Plan? (8)

   b) What are the requirements of an ideal alignment? What are the precautions to be observed while aligning hill roads? (7)

2 a) What are the factors influencing the geometric design of highways? Explain how these factors influence the geometric design standards of a highway. (8)

   b) Find safe over taking sight distance for a highway having a design speed of 80 kmph. Maximum acceleration of overtaking vehicle is 1.5 kmph per sec. (7)

3 a) Enumerate the steps for practical design of super elevation of a highway under mixed traffic conditions. (4)

   b) A National Highway passing through plain terrain (Design speed 100 kmph) in a heavily rainfall area has a horizontal curve of radius 500 m. Design the length of transition curve. Allowable rate of introduction of super elevation is 1 in 150. (6)

   c) A vertical summit curve is formed when an ascending gradient of 1 in 40 meets a descending gradient of 1 in 80. Find the length of summit curve to provide the required stopping sight distance for a design speed of 80 kmph. (5)

PART B
Answer any two full questions, each carries 15 marks.

4 a) Explain the desirable properties of aggregates as a highway material. (9)

   b) State the major differences between flexible and rigid pavements. (6)

5 a) What are the factors to be considered in design of flexible pavements and indicate their significance. (8)

b) Design the flexible pavement for the construction of a new highway with the following data (Follow guidelines as per IRC 37 2012):   (7)

Category of road- Four lane dual carriageway

Number of commercial vehicles in the year of completion of construction- 2400 CVPD per direction

Annual growth rate of commercial vehicles-5%

Design life – 15 years

Design CBR value of subgrade soil – 5%

Vehicle damage factor – 3.5

Lane distribution factor – 0.75

For CBR 5%

Traffic msa	5	10	20	30	50	100
GSB(mm)	250	300	300	300	300	300
GB(mm)	250	250	250	250	250	250
DBM(mm)	55	70	100	120	125	130
BC(mm)	25	40	40	40	50	50

6   a) Briefly illustrate the various steps in construction of a bituminous pavement.   (6)

    b) Mention the major failures in flexible pavements and their causes.   (9)

PART C
Answer any two full questions, each carries20 marks.

7   a) What are traffic characteristics? Explain the influence of different traffic characteristics on traffic performance.   (10)

    b) The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour respectively. The saturation flow values on these roads are estimated as 1850 and 1400 PCU per hour respectively. The all red time required for pedestrian crossing is 16 seconds. Design a two-phase traffic signal by Webster's method.   (10)

8   a) Explain following aircraft characteristics and their influence in planning and design of an airport: (12)

        (i)   Type and size of aircraft

        (ii)   Weight and wheel configuration

        (iii)   Speed of aircraft

        (iv)   Minimum turning radius

b) What is a wind rose diagram? How is it useful in fixing the best orientation of   (8)
   runway?

9   a) Length of a runway at Mean Sea Level (MSL), standard temperature and zero   (10)
       gradients is 1500 m. The site has an elevation of 1000 m above MSL, with a
       reference temperature of 34^0C. The runway has to be constructed with an effective
       gradient of 0.26%. Determine the actual length of the runway at the site.

   b) What are the design considerations applicable to runway lighting? Explain with   (10)
       neat sketches.

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE366
Course Name: TRAFFIC ENGINEERING AND MANAGEMENT

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.
Marks

1	a)	Explain the techniques of travel demand management.	(10)
	b)	Explain the various measures for traffic calming.	(5)
2	a)	Define tidal flow operation.	(3)
	b)	Explain the methods of implementing tidal flow operation.	(2)
	c)	Explain the various applications of ITS.	(10)
3	a)	Explain the various regulations concerning the driver.	(10)
	b)	Write short notes on Motor vehicle Act.	(5)

PART B
Answer any two full questions, each carries 15 marks.

4	a)	Define basic capacity, possible capacity and practical capacity.	(5)
	b)	With neat sketches illustrate the concept of LOS.	(10)
5	a)	List the factors that influence the capacity of signalised intersection.	(10)
	b)	Explain the procedure for computation of capacity of rotary intersection using Wardrops formula.	(5)

6   a) A three-phase traffic signal is to be installed at a right angled crossing of two city streets. The site is average and the approaches are 12m wide between kerbs. The approaches are straight and level and parking is prohibited on them. One of the phases is to be pedestrian only phase occurring at the end of each cycle. Starting delay maybe taken as 2seconds. An all-red period of 4seconds is to be provided after each vehicle phase to allow clearance of right turning vehicles left over in the crossing. The design hour traffic volumes in PCU/hour are given in the following time   (10)

From	N			E			S			W		
To	E	S	W	S	W	N	W	N	E	N	E	S
PCU/hr	40	800	70	60	500	50	60	660	60	70	680	60

Calculate the optimum cycle time for fixed time installation. Sketch the phasing diagram for each phase. Draw a diagram showing the timings for all three aspects of a complete cycle. Make suitable assumptions for amber and pedestrian interval.

b) Explain the warrants for installation of traffic signals   (5)

PART C
Answer any two full questions, each carries20 marks.

7   a) Explain the roadway factors that influences road accidents.   (12)

    b) With neat sketches differentiate between collision and condition diagrams   (8)

8   a) Describe the measures that can be adopted to prevent accidents   (12)

    b) List the assumptions made in simple queuing approach as applied to traffic flow   (8)

9   a) A toll booth at the entrance to bridge can handle 120 veh/hour, the time to   (8)
process a vehicle being exponentially distributed. The flow is 90veh/hour with a Poissonian arrival pattern. Determine: (i) the average number of vehicles in the system (ii) the length of the queue (iii) the average time spent by the vehicle in the system (iv)average time spent by the vehicle in the queue.

   b) With neat sketches illustrate the fundamental diagrams of traffic flow.   (12)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019
Course Code: CE368
**Course Name: PRESTRESSED CONCRETE**

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.

Marks

1   a)   Distinguish between pre tensioned and post tensioned members.   (4)

    b)   Explain the concept of load balancing in prestressed concrete members.   (4)

    c)   A prestressed concrete beam of section 120 mm wide X 300 mm deep is used   (7)
over an effective span of 6 m to support a uniformly distributed load of 4 kN/m,
which includes the self-weight of beam. The beam is prestressed by a straight
cable carrying a force of 180kN and located at an eccentricity of 50 mm.
Determine the location of the thrust line in the beam and plot its position at
quater and central span sections.

2   a)   What are the serviceability limit states? Discuss the IS1343-code   (3)
recommendations regarding the serviceability limit states

    b)   A bonded post-tensioned concrete beam has a flanged cross-section as shown. It   (12)
is prestressed with tendons of area 1750 mm^2 and effective prestress of 1100
N/mm$^{2.}$ The tensile strength of the tendon is 1860 N/mm^2. The grade of concrete
is M60. Estimate the ultimate flexural strength of the member.

Values are in mm
cross-section at mid span
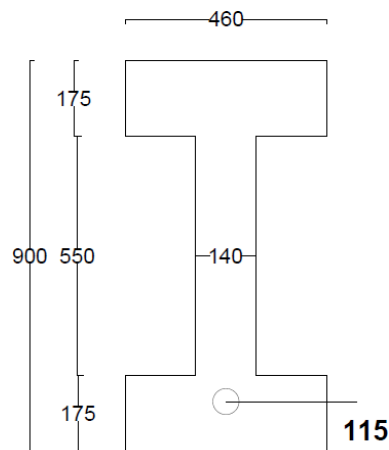
3   a)   Derive an expression for minimum section modulus in terms of dead and live   (6)
load moments, loss ratio and range of stress.

     b) A pretensioned, T section has a flange which is 300 mm wide and 200 mm thick. (9) The rib is 150 mm wide X 350 mm deep. The effective depth of cross-section is 500 mm. Given A_p = 200 mm^2, f_{ck} = 50 N/mm^2 and f_p = 1600 N/mm^2, estimate the ultimate moment capacity of the T section using Indian standard code regulations.

PART B
Answer any two full questions, each carries 15 marks.

4   a) Distinguish between web shear and flexural shear cracks in concrete beam with (4) sketches

     b) What is the effect of torsion in concrete ? How do you compute the shear stress (4) developed in different types of cross sections due to torque?

     c) A prestressed concrete beam (span 8m) of rectangular section 150mmX330mm is (7) prestessed by a curved cable having an eccentricity 100mm at the centre of span and reducing to zero at the supports is used, the effective force in the cable being 200kN, the beam supports a udl of 5kN/m which includes self weight of the member. Estimate the reduction in the principal tension

5   a) Explain the various modes of failure encountered in prestressed concrete beams (6) subjected to bending moment, shear and torsion

     b) The support section of a prestressed concrete beam,120 mm wide and (9) 270mmdeep is required to support an ultimate shear force of 70kN. The compressive prestress at the centroidal axis is 5N/mm^2. Use fck=40N/mm^2 and characteristic tensile strength of steel in stirrups is 250N/mm^2. The cover of tension reinforcement is 50mm. Design suitable shear reinforcements at the section

6   a) Distinguish clearly between short-term and long-term deflections of prestressed (3) concrete members

b) A post tensioned prestressed concrete beam of span 8m with rectangular section   (12)
300X400mm carries a prestressing force of 1000kN. If the beam supports a live load
of 20kN/m excluding its selfweight,find the deflection due to prestress and liveload
for the following cases.

   (i) The cable profile is straight and constant eccentricity of 100mm

   (ii) The cable profile is parabolic with eccentricity of 100mm at midspan and
   concentric at supports. Assume Ec=36kN/mm^2

PART C
Answer any two full questions, each carries20 marks.

7 a) Explain the terms (i)End block and Anchorage zone and (ii)Bursting tension with   (5)
   reference to prestressed members

   b) Explain with sketches the different types of cross sections generally used for poles.   (5)

   c) The end block of a post tensioned PSC beam, 300mmX300mm is subjected to
   concentric anchorage force of 800kN by Freyssinet anchorage system of area11000mm^2.
   Design and detail the anchorage reinforcement for the end block.

8 a) What are the different types of prestressed concrete sleepers? Mention their design
   considerations

   b) How the partial prestressing improves the behaviour of concrete structures.? Explain
   the terms (i) Prestressing Index (ii) Partial Prestressing Ratio (PPR)

   (i) Degree of Prestress

9 a) Sketch some typical cross sections of composite bridge decks with precast prestressed
   elements

   b) Explain the terms i) primary moment ii) secondary moment (iii) resultant moment
   iv) redundant reaction with respect to continuous prestressed concrete members

   c) A precast pretensioned beam of rectangular cross section has a breadth of 100 mm and a
   depth of 200 mm the beam with an effective span of 5 m is prestressed by tendons with
   their centroid coinciding with the bottom kern. The initial force in the tendon is 150 kN.
   The loss of prestress may be assumed to be 15%. The beam is incorporated in a
   composite T beam by casting a top flange of breadth 400 mm and thickness   40   mm.
   If   the   composite   beam   supports   a   live   load   of 8 kN/m^2, calculate the
   resultant stresses developed in precast and in situ cast concrete assuming the
   pretensioned beam as unpropped while casting the in situ slab. Assume the   same
   modulus of elasticity for concrete in precast beam   and in-situ slab.

E **E1193** **Pages: 2**

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019
Course Code: HS300
Course Name: PRINCIPLES OF MANAGEMENT

Max. Marks: 100 Duration: 3 Hours

PART A
Answer any three full questions, each carries 10 marks.
Marks

1 What are the ten managerial roles coming under Interpersonal, Informational and Decision roles. (10)

2 a) Differentiate between internal and external environment of an organisation. (4)

  b) Explain the importance of any four external factors which affect the working of an organisation. (6)

3 a) What is Hawthorne experiment ? (8)

  b) Discuss the impact of Hawthorne studies on management thought. (2)

4 a) What are the assumptions of McGregor Theory X and Theory Y ? (4)

  b) Explain Mckinsey 7-S frame work. (6)

PART B
Answer any three full questions, each carries 10 marks.

5 a) Explain the system approach to MBO. (8)

  b) Explain the benefits of MBO. (2)

6 Discuss in detail the steps in planning. (10)

7 a) What are the limitations in decision making ? (4)

  b) How do you evaluate alternatives in decision making ? (6)

8 a) Discuss decision under certainty, uncertainty and risk. (5)

  b) Differentiate between programmed and non-programmed decisions with respect to organisationizational hierarchy. (5)

PART C
Answer any four full questions, each carries 10 marks.

9 What is meant by selection of a candidate? Explain the steps of selection process (10)

10 a) Distinguish between centralisation and decentralisation of authority. (4)

   b) Write any three advantages and disadvantages of decentralisation. (6)

11 a) What is meant by job design and explain the factors influencing it. (6)

   b) Differentiate between recruitment and selection.

12 a)
D

      b)   Distinguish between transformational leadership and transactional leadership.

                                                             (
8)

13   a)   Define the concept of controlling.   (2)

                       b)   Explain the basic control proces   (8)

14   a)   What is meant by Break-Even-Analysis ?   (7)

                 b)   Explain benefits and limitations of Break-Even Analysis.   (3)

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