Khulna University of Engineering & Technology

Department of Architecture

B. Arch 2nd Year Backlog Examination, 2022

Course No: CE 3223   Course Title: Plumbing

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
       ii) Figures in the right margin indicate full marks

Section-A

1. a) Classify water transmission system, briefly explain with the heat sketch.   15
    b) Differentiate between branched distribution network and looped distribution   10
       network.
    c) Describe with neat sketch   10
        I.   Hydrological cycle
        II.   Artesian aquifer

2. a) Briefly explain the elements of water supply with neat sketch.   15
    b) What are the planning and design considerations for a water supply system.   10
    c) What are the basic difference in water supply and plumbing between high-rise   10
       and low-rise buildings?

3. a) Calculate the peak demand of a city having present population of 1, 00,000 with   10
       a growth rate of 2%. The design period is 20 years and per capita water demand
       is 140 lcpd with 2.0 peak factor. Assume loss and waster percentage is 30%.
    b) What are the firefighting components necessary for a residential building?   10
    c) Explain the working principle of wet fire sprinkler system.   10
    d) What are the basic cause of fire in Bangladesh?   05

4. a) A 6 cm diameter hose pipe in the fire protection system is used for firefighting   06
       in a building. The discharge through the pipe is 450 lpm. Friction coefficient is
       120. Wall thickness of pipe is 0.75 cm. find the frictional loss of a hose pipe.
    b) Calculate the flow in each pipe in the following 100 ped network by Hardy   24
       cross method. When the roughness coefficient is 120.

Φ=Pipe diameter
C=120
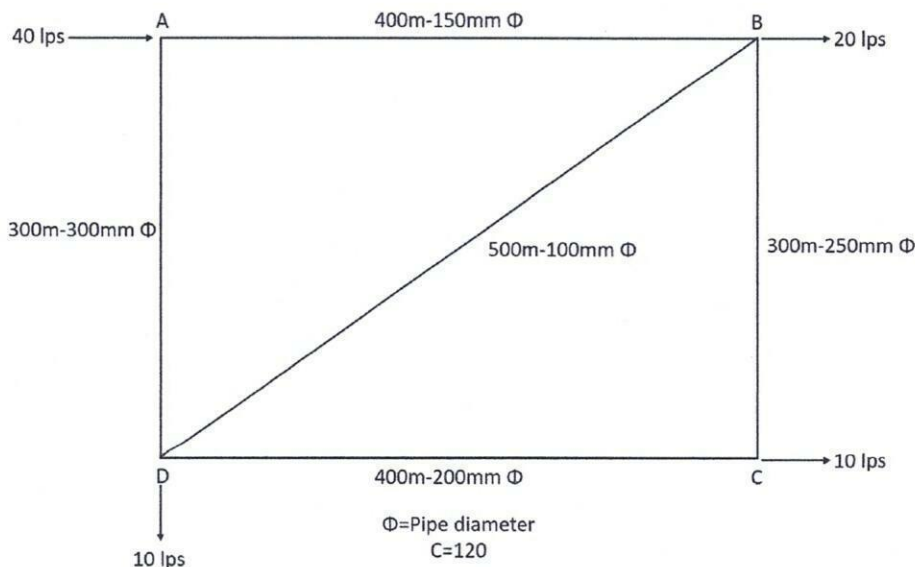
c) Draw a typical daily water demand curve. 05

Section-B

5. a) What is CBOD. Explain the term NBOD-with reaction. 07

   b) The BOD_5 of a waste water is determined as 160 mg/L. the k value is known as 0.23 per day. What would be the BOD_8 if the test were run at 15^0 c. 10

   c) What is trickling filter? Draw a typical trickling filter and explain its working principle. 18

6. a) Find the minimum velocity and gradient required to transport sewage through sewer of 59 cm diameter with organic materials of maximum 1.00 cm diameter and G_S=1.20. assume, k=0.05, f=0.019 and sewer run full and n=0.013 15

   b) What are the types of sewerage collection system-describe briefly. 15

   c) Describe the hydraulic design of sewers. 05

7. a) What are the functions of different types of pond in waste stabilization pond system of treatment? 10

   b) Explain the algae-bacteria symbiosis of a facultative waste stabilization pond. 08

   c) What are the physical design considerations of waste stabilization pond-describe briefly. 10

   d) Draw the flow diagram for conventional water treatment systems. 07

8. a) Design a waste stabilization pond system to treat waste water from a low-income settlement with a population of 20,000 at khalishpur Khulna. The average waste water flow is about 110 liters per person per day and the BOD contribution is 35 gm/person/day. The mean temperature of the coolest month is 20^0 c and during irrigation season, 25^0 c. It is described that the final effluent be used for crop irrigation. Assume, faecal coliform concentration in raw waste-water to be 1×10^8 per 100 ml and permissible $F_C \leq 1000/100$ ml. volumetric loading rate at 20^0c is 320 gm/m^3/day and BOD removal at 20^0c is 60%. BOD surface loading rate at 20^0c is 255 kg/ha/day and at 25^0c is 350 kg/ha/day. 35

Khulna University of Engineering & Technology

Department of Architecture

B. Arch 2nd Year Backlog Examination, 2022

Course No: HUM-2125   Course Title: Principles of Economics

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
       ii) Figures in the right margin indicate full marks

Section-A

1. a) Why is 'What to produce' and 'How to produce' a problem in every economy? How do these problems can be solved in a command economy?   20

    b) What are the non-price factors that determines the quantity of a good that consumers demand?   15

2. a) Explain market equilibrium with the help of demand and supply curve.   15

    b) What is meant by production? Interpret the different kinds of factors of production.   20

3. a) Define price elasticity of demand. Explain the types of price-elasticity of demand with examples.   15

    b) What are the factors that govern the size of price elasticity of demand?   15

    c) What is cross-price-elasticity of demand?   05

4. a) Why sellers in the perfect competition market, individually can not set the price of their products?   10

    b) Define short-run. Under what conditions a perfect competition market get maximum level of output? Explain with necessary figure.   25

Section-B

5. a) Distinguish between GNP and GDP.   07
    b) Explain various methods of national income accounting.   20
    c) Interpret different problems that arise in calculating national income.   08

6. a) What is inflation? Explain the various types of inflation.   15
    b) What are the monetary measures that can be taken to reduce inflation in an economy?   20

7. a) Define savings and investment. Why do savings and investment always equal?   15

    b) "Higher savings lead to higher standard of living." – Explain.   20

8. a) Define monetary policy.   05
    b) What are the objectives of monetary policy?   15
    c) Discuss the tools of fiscal policy.   15

Khulna University of Engineering & Technology

Department of Architecture

. B. Arch 2nd Year Backlog Examination, 2022

Course No: Arch 2231   Course Title: Islamic Architecture in the Indian
Subcontinent

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
ii) Figures in the right margin indicate full marks

Section-A

1.	a)	Illustrate the structural development of the Tomb of Iltutmish with sketches.	10
	b)	Mention the key characteristics of Islamic architecture in the Indian subcontinent and discuss the history of it.	25
2.	a)	Discuss the architectural features of Qutub Minar with neat sketches.	25
	b)	Illustrate the plan of Khirki Masjid.	10
3.	a)	"Provincial styles had a significant regional manifestation of the Islamic architecture."- Explain.	10
	b)	Illustrate the plan and elevation of Alai Darwaja featuring different architectural features.	25
4.		Do you think the city of Firuj Shah Kotla was a prototype of Mughal Palace cities? Justify your opinion with necessary sketches.	35

Section-B

5.	a)	"Jahangiri Mahal, a true synthesis of Timurid, Persian and Indian traditions" Elaborate the statement with evidence and examples.	25
	b)	Draw and identify the features of Shahjahani Column.	10
6.	a)	Write short note on "Bulland Darwaza" at Fatehpur Sikri.	15
	b)	Describe the architectural features with neat sketches (any 02):	10+10 =20
		i. Diwan-i-Khass	
		ii. Panch Mahal	
		iii. Bulland Darwaza	
7.	a)	Describe the features of Qila Kunha Mosque at Delhi under Sun dynasty with neat sketches.	25
	b)	What was the concept of "Din-i-ilahi"?	10
8.	a)	Draw the elevation of the Tomb of Hasan Khan and identify the architectural features.	20
	b)	What architectural contribution did Emperor Jahangir bring to the Mughal Garden? Explain with necessary sketches.	15

Khulna University of Engineering & Technology

Department of Architecture
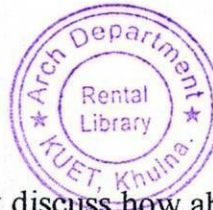
B. Arch 2nd Year Backlog Examination, 2022

Course No: Arch 2251   Course Title: Architectural Acoustics

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
        ii) Figures in the right margin indicate full marks

Section-A

1. a) What is 'Absorption co-efficient'? Briefly discuss how absorption co-efficient affects when sound wave hits a surface. Explain it with different surfaces and diagrams.   5+20 =25

    b) A library has 700 sabin of absorption and an adjacent classroom is the source of 80 dB sound level. They have a shared area of 300 Sq ft. and a transmission loss of 45 dB, find the sound level in the library.   10

2. a) "Design for the Ear" – Discuss the idea focusing on education.   10

    b) Illustrate acoustical treatments of a rectangular living room having one entertainment unit at the end of the room, Indicating details about the acoustical treatments.   25

3. a) Explain the acoustical considerations of an ancient Greek theatre with sketch showing all the components of the theatre.   25

    b) Find the combined sound intensity level of the following instruments.   10
        i.   Two banjos at 70 dB
        ii.   Three guitars at 72 dB
        iii. One drum set at 69 dB
        iv.   One piano at 71 dB

4. a) A car honking its horn (80 dB) at 5ft. One person is hearing the horn at 62 dB, how far is the person from the car?   10

    b) A conference room with dimension 50ft X 40ft and a height of 12ft has a noise reduction co-efficient (NRC) of 0.10 for walls, 0.05 for celling, and 0.20 for the floor. If 60% of the celling is treated with materials (0.80) NRC. Calculate the reduction in the reverberation time.   25

Section-B

5. a) What are the major factors to be considered to determine an auditorium layout? Explain with appropriate illustration.   25

    b) Discuss the fundamental requirements in redesigning your design studio for a lecture room.   10

6. Illustrate echo controlling principles for spaces with necessary sketches.   35

7. a) Discuss the features of three commercial acoustical materials including   25
    their advantages and disadvantages.

    b) Draw the diagrams for 'Directivity Contours of Speech'   10

8. a) Discuss how earth berms work as noise barriers in different cases.   25
    Explain with sketches.

    b) Elaborate the 'Acoustical Material Typologies' in brief.   10
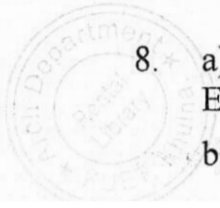
# Khulna University of Engineering & Technology

Department of Architecture

B. Arch 2nd Year Backlog Examination, 2022

Course No: Arch 2131   Course Title: Buddhist and Hindu Architecture in the Indian Subcontinent

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
   ii) Figures in the right margin indicate full marks

Section-A
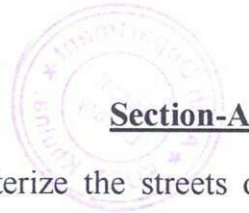
1. a) How do you characterize the streets of the cities of Harappa and Mohenjo-Daro? Illustrate the grid of main and subsidiary streets of Mohenjo-Daro in a layout plan.   15

    b) Illustrate the great bath at Mohenjo-Daro and discuss the sewerage system of the city with necessary details.   20

2. a) Illustrate the elevation of an ideal Buddhist Stupa with proper annotations.   15

    b) Illustrate the plan and sectional perspective of Chaitya Hall   20

3. a) Illustrate the stone Vedika at Sanchi depicting its main features.   10

    b) Illustrate the layout of an ideal Vedic town explaining its different characteristics.   10

    c) Write a short note on the excavated remains of Nalanda University illustrating the plan.   15

4. a) Illustrate the plan and section of Karli Cave and discuss its features.   25

    b) Draw a neat elevation of typical window opening seen during the Andhra period.   10

Section-B

5. a) Evaluate common architectural characteristics of Orissan group of Indo-Aryan style with proper references and sketches.   25

    b) Mention the general architectural features of Khajuraho Group Central India of Indo-Aryan style.   10

6. a) Write short notes on: 5X2

        I.   Seni   =10

        II. Silpa

    b) Analyze the geometry of Hindu temple from the concept of 'Vastupurasamandala'   10

c) How the geometry of Vastupurasamandala can formulate a climatically comfortable house? Explain with proper illustration.   15

7. a) Mention the architectural characteristics of Mohendra group from the Dravidian style perspective.   15

b) Demonstrate the basic features of temple architecture from Rajasimha Group.   20

8. a) Differentiate the general characteristics of architectural ornamentation and design pattern in Pallavas and Cholas.   20

b) Write short notes on: 3X5
=15
    I.   Vijayanagar
    II.   Rock-cut temple
    III.   Dressed stone type temple
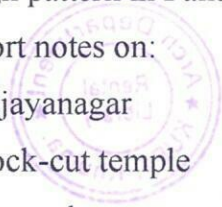
Khulna University of Engineering & Technology

B. Arch. 2nd Year Backlog Examination, 2022

Department of Architecture

Course no: HUM 2225   Course title: Philosophy

Full Marks: 210   Time: 3 hrs.

N.B.   i) Answer any three questions from each section in separate script
       ii) Figures in the right margin indicate full marks

Section A

01. a) What is philosophy?   10
     b) Discuss the scope of philosophy?   10
     c) Explain the function of philosophy.   15
02. a) What is epistemology?   10
     b) Describe the method of criticism.   10
     c) Explain the theory of Authoritarianism about the origin of knowledge.   15
03. a) Explain freedom of Will About John Locke.   15
     b) Explain the theory of impressions and ideas of David Hume.   15
     c) What is Axiology?   05
04. a) Truth, Beauty and Value-explain these three principles of philosophy.   15
     b) Discuss about the philosophy of God.   10
     c) Give some proof for the existence of God.   10

Section B

05. a) What do you mean by evolution?   10
     b) Discuss briefly the mechanical evolution.   10
     c) Discuss about the characteristics of evaluation.   15
06. a) What is phenomenalism?   10
     b) What is the relation between Phenomenalism and Existentialism?   10
     c) Explain the importance of 'Confucianism'.   15
07. a) Define 'pragmatism'.   10
     b) What were the main concerns of Frankfurt school?   10
     c) What is the difference between creation and evaluation   15
08. a) What is applied philosophy?   10
     b) Why should we study applied philosophy? Explain it with example.   10
     c) Explain briefly the common characteristics of Indian philosophy.   15

Khulna University of Engineering & Technology

Department of Architecture

B. Arch 2nd Year Backlog Examination, 2022

Course No: CE-2225   Course Title: Structure II

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
       ii) Figures in the right margin indicate full marks

Section-A

1.   a)   Define the following terms: 08
                 i.   Normal Stress
                 ii.   Shearing Stress
                 iii.   Bearing Stress
                 iv.   Strain

    b)   The rigid bars AB and CD shown in **Figure 1(b)** are supported by pins at A   15
and C and the two rods. Determine the maximum force P that can be applied
if the vertical movement is limited to 5mm. Neglect the weight of all
members.
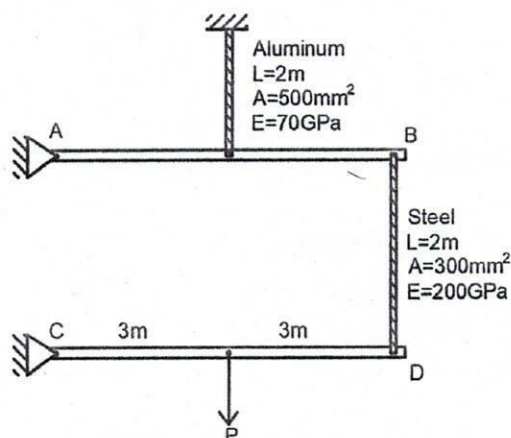
Figure 1(b)

    c)   Two bars made of copper and Aluminum are fixed to the rigid abutments.   12
Originally, there is a gap of 5mm between the ends as shown in **Figure 1(c).**
Determine the average normal stress in both bars if increase the temperature
from 10°C to 210°C. Also, calculate the individual bar deformation.
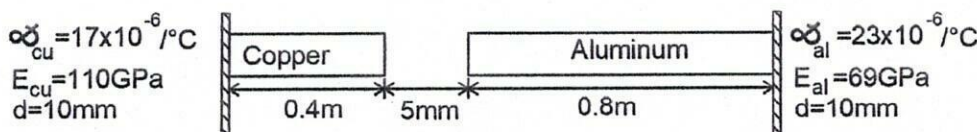
Figure 1(c)

2.   a)   Draw a typical stress-strain diagram of mild steel and describe it's various   12
features. How can you determine the yield point of brittle material?

    b)   Calculate the average shear stress on the 20 mm pins at A and B for the   11
given loads shown in **Figure 2(b).** Assume single shear at pin B and double
shear at pin A.
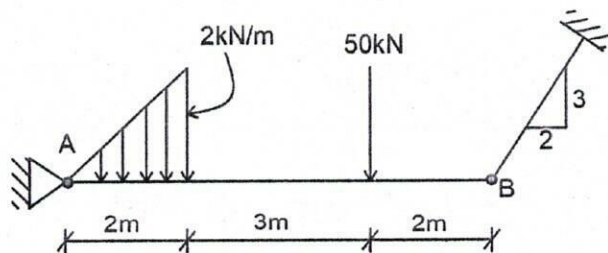
Figure 2(b)

c) A rigid block of mass m is supported by three symmetrically spaced rods as shown in **Figure 2(c)**. Each copper rod has an area of 900mm²; E=120GPa; and the allowable stress is 70MPa. The steel has an area of 1200mm²; E=200 GPa; and the allowable stress is 140MPa. Determine the largest mass m which can be supported.   12
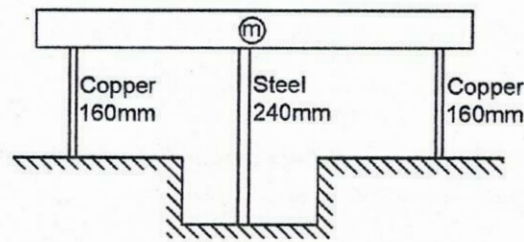
Figure 2(c)

3. a) What are the assumptions used in the analysis of trusses? For the truss members shown in **Figure 3(a),** find the stresses in members CE, DE, and DF. The cross-sectional area of each member is 1.8in².   20
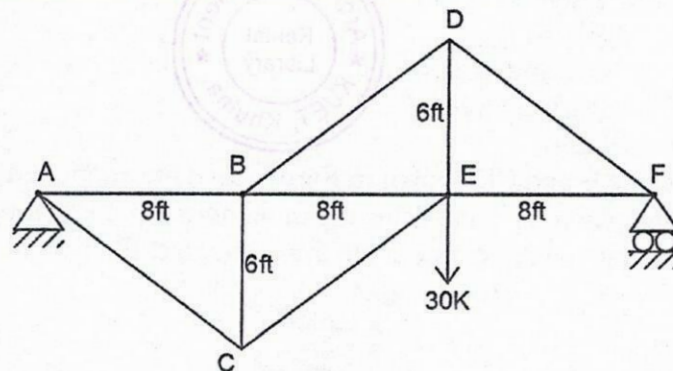
Figure 3(a)

b) State and describe the theorems of the area moment method.   15

4. a) Write short notes on flexural rigidity.   05
   b) A cantilever beam is loaded, as shown in **Figure 4(b)**. Calculate the maximum slope and deflection. Given, E=29000ksi and I=341in⁴.   30

5K/ft

10ft
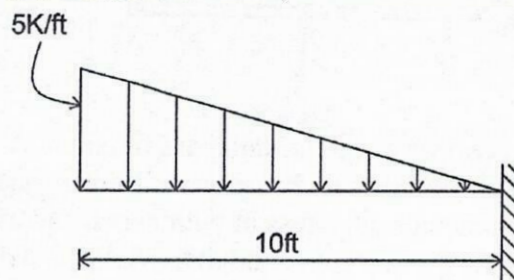
Figure 4(b)

Section-B

5. a) Define i. Pure Bending,   ii. Ordinary Bending,   iii. Dangerous section,   10
      iv. Inflection point, v. Point of contraflexure.

   b) Draw Shear Force & Bending Moment Diagrams for the following beam.   25
      Figure 5(b).

40K   10K/ft   30K   15K/ft
         20K/ft
                   Internal Hinge

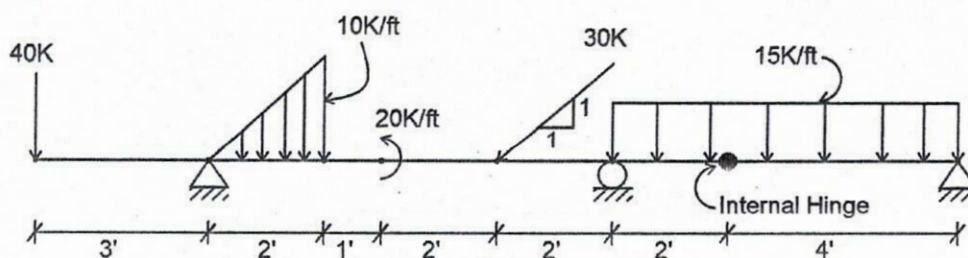3'   2'   1'   2'   2'   2'   4'

Figure 5(b)

6. a) Derive the relationship between load, moment and shear.   10
   b) A concrete beam of 12m long is shown in **Figure 6(b)**. Determine the maximum flexural stress for both tension and compression.   25

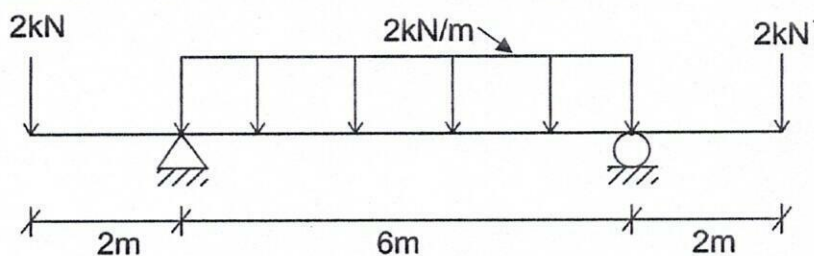2kN   2kN/m   2kN

2m   6m   2m

Figure 6(b)

7. a) Derive the formula for horizontal shearing Stress $\tau = VQ/Ib$, Where the symbols bear their usual meanings.   10
   b) Determine the width of the beam shown in **Figure 7(b)** below, where the maximum Shearing Stress of the beam should not exceed 900psi.   25

3K/ft   20K   b

12"

4'   2'
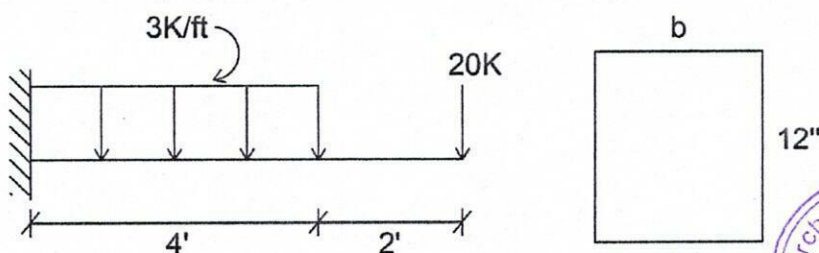
Figure 7(b)

8. a) Two columns having a load of 100kN set on a spread footing are shown in **Figure 8(a)**. Draw the Shear Force and Bending Moment diagrams of the foundation.   15
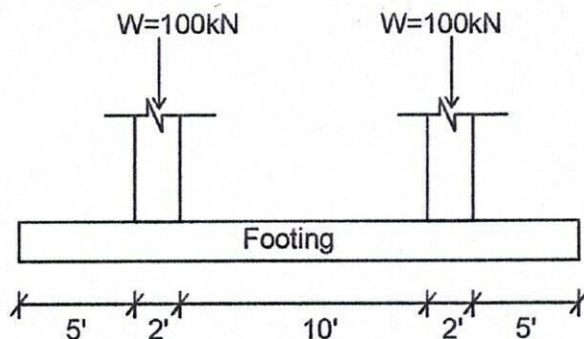
W=100kN   W=100kN

Footing

5'   2'   10'   2'   5'

Figure 8(a)

   b) If an element is subjected to the state of stress, as shown in **Figure 8(b)**. Determine the principal stresses. Also, compute the stress components on a plane 60° clockwise from the X-face.   20
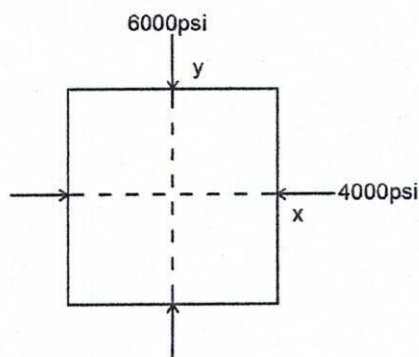
6000psi

y

4000psi

x

Figure 8(b)

Khulna University of Engineering & Technology

Department of Architecture

B. Arch 2nd Year Backlog Examination, 2022

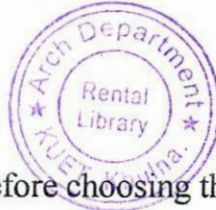Course No: Arch 2161   Course Title: Construction Details

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
ii) Figures in the right margin indicate full marks

Section-A

1.   a) Why is it important to explore the site before choosing the appropriate   15
foundation?

b) Given no budgetary restraints and no site obstacles, which form of   20
foundation would you use to construct a typical six-story residential
building, and why? Elaborate the construction process with neat
sketches.

2.   a) What is 'Raft Foundation'? Briefly discuss the method of construction   15
with proper drawings.

b) Briefly discuss the type of materials for DPC (Damp Proof Course)   20
and the rules of choosing the best option. Summarize the effects of
dampness on a building.

3.   a) Discuss Combined Footing.   10

b) Briefly discuss 'Friction Piles' and 'Bearing Piles'.   15

c) Describe the pros and cons of construction using 'Timber Pile'.   10

4.   a) Describe the timber piles briefly. Use relevant illustrations.   15

b) Write short notes on: (any two)   2X10
i) Wall footings   =20
ii) Inverted Arch footings
iii) Concrete Piles

Section-B

5.   a) Which factors are important during selection of flooring material?   15
Explain with example.

b) Between marble flooring and cement concrete flooring which one   20
would you suggest for a community hospital and why?

6.   a) Identify different components of a stair with neat sketches.   15

b) Explain 'Bay window' and 'Gable window' with necessary sketches.   20

7. a) Explain the advantages and disadvantages of flat roof.   15

    b) What is expansion joint?   05

    c) Which materials are used for expansion joints? Discuss in brief.   15

8. a) Explain the general features of cavity wall with neat sketches.   15

    b) What are the benefits of cavity wall?   15

    c) Write a short note on 'Slenderness ratio'.   05

Khulna University of Engineering & Technology

Department of Architecture

B. Arch. 2nd Year Backlog Examination, 2022

Course No: URP 2225   Course Title: Urban Planning Principles

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
       ii) Figures in the right margin indicate full marks

Section-A

1.	a)	What is Urban Planning? What are the components of Urban Planning?	10
	b)	Write down the similarities and dissimilarities between Garden city and New Town.	15
	c)	Write down the role of an Architect in Urban Planning.	10
2.	a)	Discuss the characteristics of Satellite Town with sketch of their patterns.	15
	b)	Describe the tools of Urban congestion management.	12
	c)	Why has the ideal city movement started globally?	08
3.	a)	Discuss the spatial priorities of a rail station with reference to Khulna Rail Station.	15
	b)	Mention the principles and components of TOD.	10
	c)	Write down the characteristics of regional or national open spaces with example of Bangladesh's recreational areas.	10
4.	a)	Briefly discuss the components of Airport layout.	15
	b)	Why is the sea port development essential for the growth of Bangladesh?	06
	c)	Discuss the issues that a Planner needs to consider while planning a Bus Terminal.	14

Section-B

5.	a)	What is the rank-size rule in urban geography, and how does it describe the population distribution of cities within a country?	10
	b)	Provide an overview of the factors contributing to the emergence and development of primate cities in various regions. State the challenges associated with having a primate city in a country's urban hierarchy.	15
	c)	Explain why Central Place Theory uses hexagons for market areas and how this geometric choice enhances the theory's efficiency.	10
6.	a)	Discuss various types of towns based on their specific functions with necessary examples.	15
	b)	Provide a comprehensive overview of the essential factors that one should take into account when determining the valuation of land.	15
	c)	Explain the types of radial pattern towns with necessary diagram.	05
7.	a)	Write a short overview of road classification provided by American Association of State Highway and Transportation Officials (AASHTO).	12
	b)	Provide a comprehensive comparison between a 'traffic lane' and a 'carriageway' in the context of road design and traffic management.	08
	c)	Provide a brief discussion on the functions of the shoulder, median, and lay-by of a road.	15
8.	a)	"Industrial location within a town can be controlled or influenced by concession, persuasion and restriction". Justify the statement.	08
	b)	Present a case-study illustrating the concept of industrial agglomeration, and subsequently, provide a concise analysis of both its benefits and drawbacks.	15
	c)	Narrate the parameters that one should take into account for the development of an industrial park.	12

Khulna University of Engineering & Technology

Department of Architecture

B. Arch. 2nd Year Backlog Examination, 2022

Course No: CE 2125   Course Title: Structure I: Mechanics

Full Marks: 210   Time: 03 Hours

N.B   i) Answer any three questions from each section in separate script
       ii) Figures in the right margin indicate full marks

Section-A

1. a) Define the following terms: 12
      (i) Two force member (ii) Moment of a force (iii) Shear force (iv) Bending moment.

   b) Describe the principle of transmissibility of force.   08

   c) A boat is being pushed forward against a resistance of $Q = 67lb$, which is shown in   15
      the following figure. If the resultant force in the X direction is $R = 120lb$, determine
      the value of F and θ.
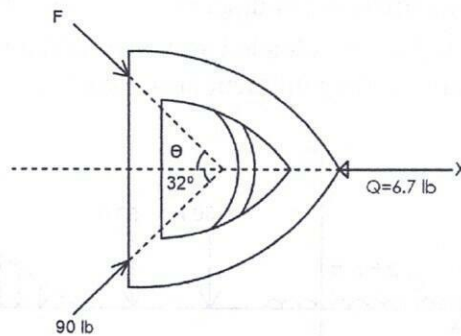
Figure-1(c)

2. a) Describe different types of force system with appropriate figure.   10

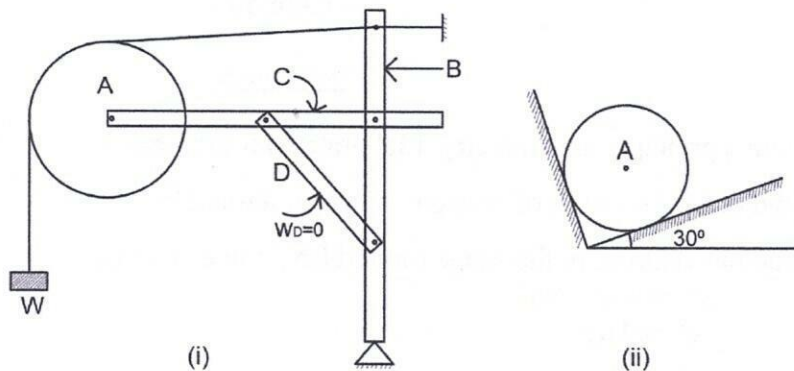   b) Draw the free body diagram of the members as shown in the following figure.   10

Figure-2(b)

   c) The permissible internal force on timber AB (Figure- 2c) is $4\ kips$. If $\theta = 30°$, what 15
      maximum safe load may be suspended at B?
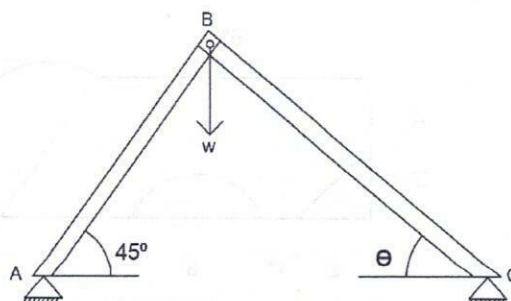

Figure-2(c)

3. a) Differentiate between-
        (i) Engineering stress and true stress (ii) Strain and deformation (iii) Elasticity and   16
        plasticity (iv) Proportional limit and elastic limit
    b) Write down the name of various types of beams.   04
    c) A 2500 *lb* wheel with a radius of *3 ft.* is acted upon by a force P (Figure-3c), which   15
        tends to pull the wheel over the obstruction at *A*. At the instant the wheel is about to
        move, the pressure between the wheel and the ground is zero. What is the magnitude
        of the force P at this instant if $\theta = 30°$?
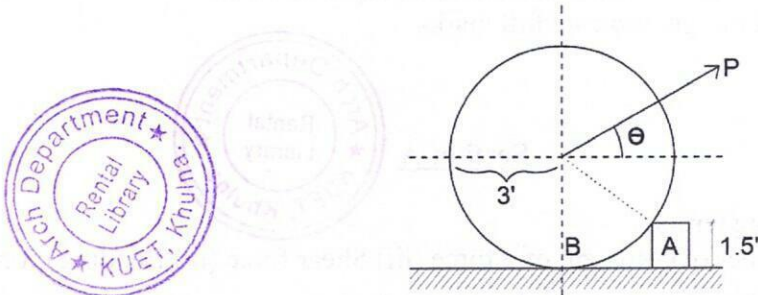
Figure-3(c)

4. a) What is support? Write the various types of support and their properties.   09
    b) Draw comparative stress-strain diagram for different materials.   06
    c) A simply supported beam is loaded as shown in the figure below. Also determine   20
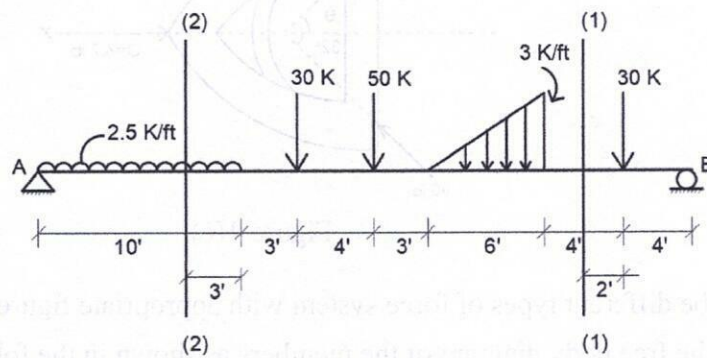   the shear force and bending moment at section (1)-(1) and (2)-(2).

Figure-4(c)

Section-B

5. a) Define principle of symmetry. Elaborate with example.   10
    b) Find out the location of centroid $(\bar{x}, \bar{y})$ for a triangle.   10
    c) Find out centroid of the shape formed from the equations: 15
        $$y^2 = 16x \text{ , and}$$
        $$x^2 = 16y$$

6. a) Prove that for any arbitrary shape the centre of gravity is $\bar{x} = \int xdw/w$, and   10
        $\bar{y} = \int ydw/w$
    b) Locate the centroid of an parabolic arc $x = y^2$ and a straight line $x = 1m$.   10
    c) Find the centroid of the unshaded portion of the figure shown below (only for x 15
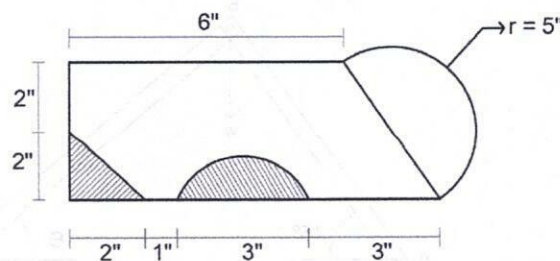   axis).

Figure-6(c)

7. a) Prove that $I = \bar{I} + Ad^2$. Where the symbols bear their usual meanings.　　　10

b) Prove that, for a triangle the moment of inertia $I_x = bh\,3/12$, where the symbols bear their usual meanings.　　　10

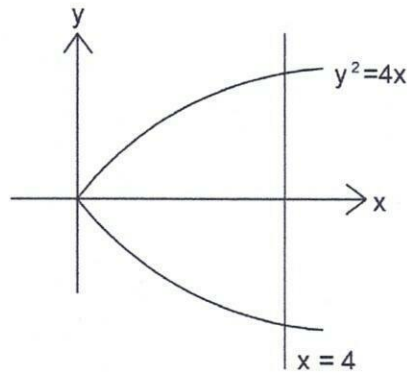c) Determine the I_x and I_y for the following shape.　　　15

Figure 7(c)

8. a) Determine the moment of inertia of a circular area about a dimensional axis whose radius is "r".　　　10

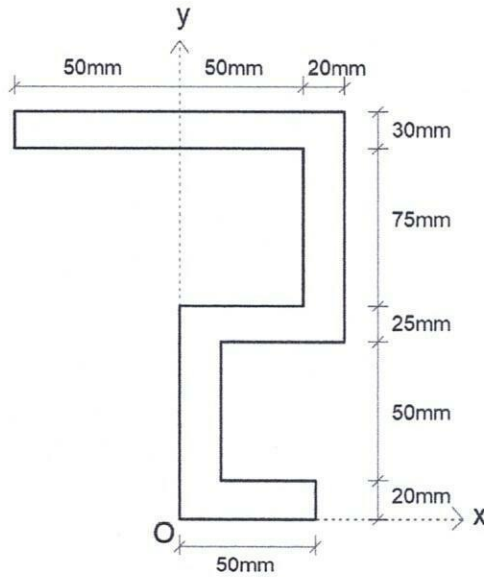b) Determine the I_x , I_y , $\bar{I_x}$ and $\bar{I_y}$ for the shape shown below.　　　25

Figure 8(b)