University of Asia Pacific
Department of Civil Engineering
Mid Examination Fall 2022
Program: B. Sc. Engineering (Civil)

Course Title: Engineering Mechanics | Credit Hours: 3.0 | Course Code: CE 101
Time: 1-hour | Full Marks: 40

ANSWER ALL THE QUESTIONS

1. ***Fig.1*** shows a system of forces acting on a structure. Calculate the magnitude, direction, and location of resultant of the forces. **10**

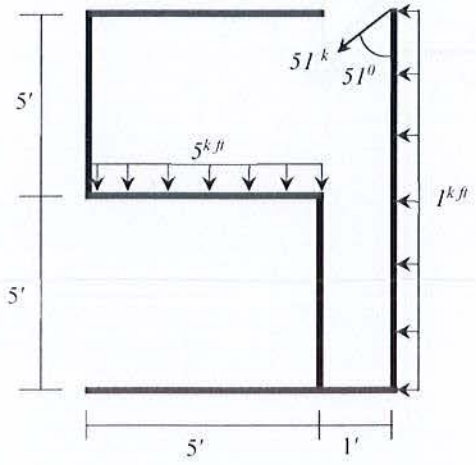

Fig.1

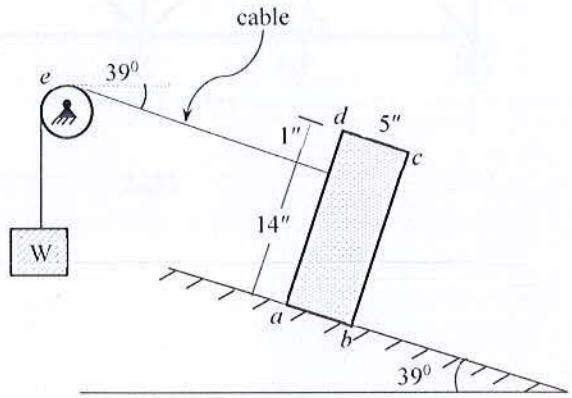

Fig.2

2. A block ***abcd*** is pulled by weight W which is connected with the block by a cable as shown in ***Fig.2***. Calculate the weight W for impending sliding or impending tipping/overturning rightward of the block [Given: Weight of block ***abcd*** = 51 lb., Coefficient of static friction: between the block and inclined surface = 0.20, between the pulley and cable = 0.30]. **10**

3. In the beam loaded as shown in ***Fig.3***, calculate the (i) reactions at supports ***b*** and ***e***, and (ii) shear force and bending moment at point ***d***. **10**

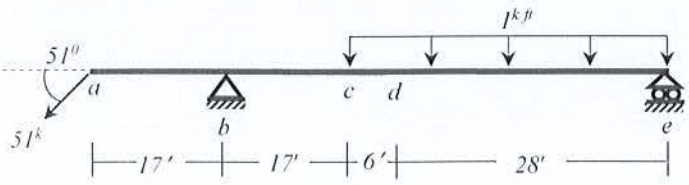

Fig.3

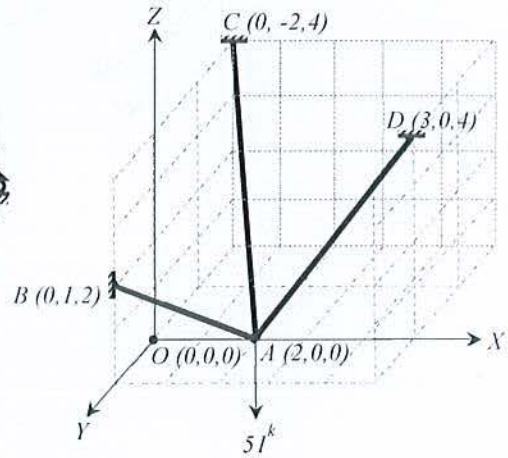

Fig.4

4. Calculate the tensions in cord AB, AC and AD used to support the 51 kips load (which acts in the Z direction) shown in ***Fig.4***. **05**

5. In the truss loaded as shown in ***Fig.5*** (i) Identify zero force member(s) (ii) Calculate the reactions at support ***a*** and ***e*** (ii) Calculate forces in members ***hg***, ***cg***, and ***cd***. **05**

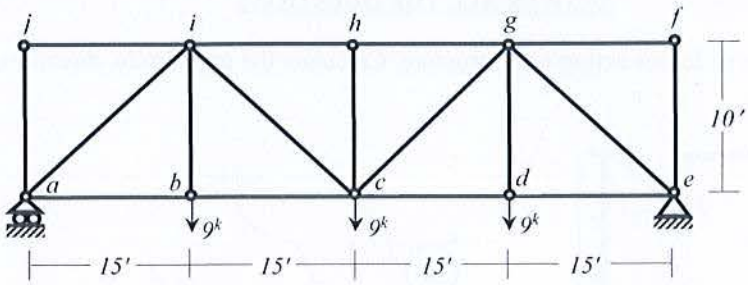

Fig.5

University of Asia Pacific
Department of Basic Sciences and Humanities
Midterm Examination, Fall-2022
Program: B.Sc. Engineering (Civil)

Course Title: Physics I | Course Code: PHY 101
Time: 1 hour | Credit Hour: 3.0 | Full Marks: 60

There are **FOUR** questions. Answer any **THREE**. Figures in the right margin indicate marks.

1. a) Define Poisson's ratio. Show that the value of Poisson's ratio lies between -1 to 0.5. **[15]**

   b) A load of 10 kg is suspended by a metal wire 3 m long and having a cross-sectional area of 4 mm^2. Find **[5]**

   (i) the stress
   (ii) the strain and
   (iii) the elongation.

   [Young's modulus of the metal is $Y = 2.0\times10^{11}\ Nm^{-2}$]

2. a) State and prove parallel axis theorem for moment of inertia. **[10]**

   b) A body is thrown with a velocity of 30 ms^{-1} at an angle of projection 60^0. Find maximum height, time of flight and range of the projectile. (Take g = 10 ms^{-2}) **[10]**

3. a) State and prove Bernoulli's theorem for a fluid having streamline motion. **[15]**

   b) Water flows out of a pipe at the rate of 4.0 cm^3/s. Find the velocity of the water at a point in the pipe where the diameter is 0.60 cm. **[5]**

4. a) Show that in case of longitudinal strain, work done per unit volume is equal to $\frac{1}{2}\times$ stress $\times$ strain. **[15]**

   b) Find the work done in stretching a wire of 1.0 mm^2 cross sectional area and 2.0 m long through 0.1 mm. **[5]**

   [Young's modulus of the wire is $Y = 2.0\times10^{11}\ Nm^{-2}$]

University of Asia Pacific
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Midterm Examination, Fall 2022
Program: B.Sc. Engineering (Civil)

Course Title: Mathematics I | Course Code: MTH 101
Time:1 hour | Credit Hour: 3.00 | Full Marks: 60

There are FOUR (4) questions. Answer THREE (3) questions including Q1 and Q2. Figures given in the right margin indicate the marks of the respective questions.

1. a. Let $f(x)=\begin{cases}\dfrac{x^2-9}{x+3}, & x\neq -3\\ 2k, & x=-3\end{cases}$. Find k so that $f(-3)=\lim\limits_{x\to -3} f(x)$. **10**

b. Evaluate $\lim\limits_{x\to 1} x^{\frac{1}{1-x}}$. **10**

2. a. Let $f(x)=\begin{cases}\dfrac{1}{2}-x \text{ for } 0<x<\dfrac{1}{2}\\ \dfrac{1}{2} \text{ for } x=\dfrac{1}{2}\\ \dfrac{3}{2}-x \text{ for } \dfrac{1}{2}<x<1\end{cases}$. Test the differentiability of $f(x)$ at $x=1/2$. **10**

b. Find the domain and range of (i) $f(x)=2+\sqrt{x^2-5x+6}$ (ii) $g(x)=\dfrac{x-1}{x+1}$ **10**

3. a. If $y=e^{a\sin^{-1}x}$ then show that $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-(n^2+a^2)y_n=0$. **10**

b. State Mean-Value Theorem (**MVT**). Discuss the applicability of the Mean-Value Theorem (**MVT**) for the function $f(x) = x^3 + 1$ over (1, 2). **10**

OR

4. a. Find the radius and height of the right circular cylinder of largest volume that can be inscribed in a right circular cone with radius 6 inches and height 10 inches. **10**

b. If $u=\tan^{-1}\left(\dfrac{x^3+y^3}{x-y}\right)$, show that $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=\sin 2u$. **10**

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Midterm Examination, Fall-2022
Program: B.Sc. Engineering (Civil)

Course Title: Basic Electrical Engineering | Course Code: ECE 101
Time: 1 hour | Credit Hour: 3.00 | Full Marks: 60

There are Four Questions. Answer any Three including Q-1 and Q-4. All questions are of equal value. Figures in the right margin indicate marks.

1. a) The voltage across a 5kΩ resistor is 16V. Compute the current through the resistor and also the power dissipated in the resistor. **[5+15]**

   b) For the bridge network in Figure:1, Calculate R_{ab} and i.

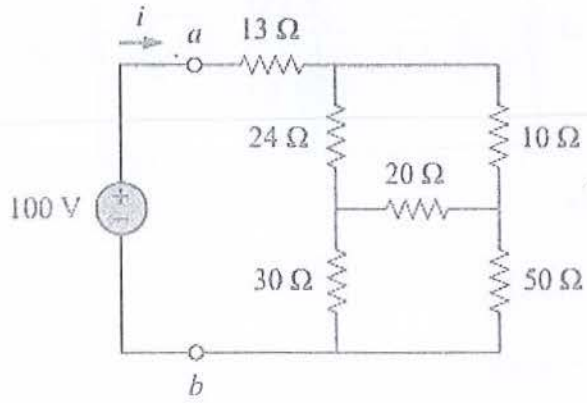


Figure :1

2. Using Node analysis determine voltage V_1, V_2, and the power dissipated in all the resistors and sources in the circuit of Figure:2 **[20]**

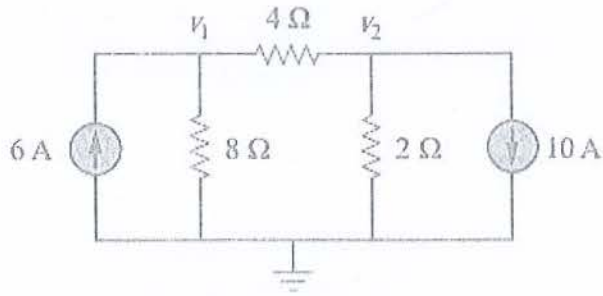
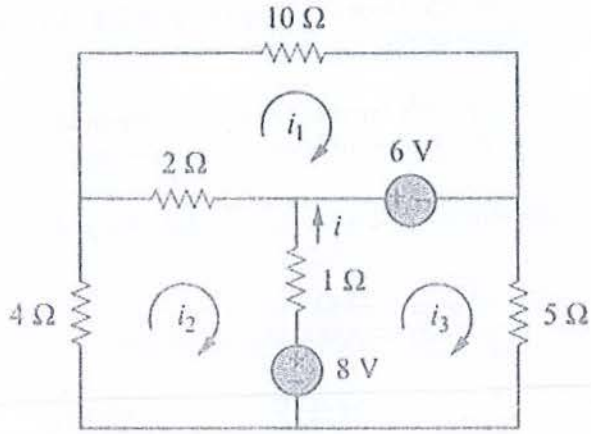


Figure :2

Or

3. Apply mesh analysis to find current i in Figure:3 and also calculate the power in the resistor [20]



1Ω, 5Ω and 8V source.

Figure :3

4. State the Superposition Principle. Use superposition principle to find current i in Figure:4 [5+15]

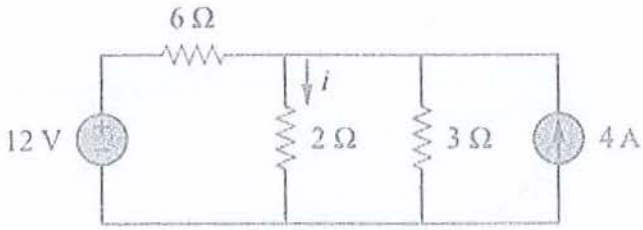


Figure :4

University of Asia Pacific
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Mid Term Examination, Fall 2022
Program: B. Sc. Engineering (Civil)

Course Title: History of Bangladesh Independence, Society and Culture | Course Code: HSS 105
Time: 01 hour | Credit Hour: 03 | Full Marks: 60

Use separate answer scripts for Part-A and Part-B. All questions are of equal value. Figures in the right margin indicate marks.

Part - A

Answer **ANY ONE.**

1.	a.	What do you understand by the Language Movement?	15
	b.	Discuss the results of this Movement.	15
2.	a.	What was United Front?	15
	b.	Discuss the impacts of United Front on 1954 elections.	15

Part - B

Answer **ANY ONE.**

3.	a.	Define sociological imagination.	5
	b.	Discuss the origin and development of sociology.	20
	c.	Define social structure and write down the components of social structure.	5
4.	a.	What is a social institution?	5
	b.	Discuss the contribution of European scholars in sociology.	20
	c.	Explain the social construction concept with examples.	5