BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Sc. Engineering Examinations 2021-2022

Sub : **WRE 101** (Analytical mechanics)

Full Marks : 210                         Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

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## SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) If the weight of the body A, B, and C are 1200 lb, 300lb and 3500 lb, respectively and the force R is 7000 lb, find the force $Q$ required to the body in equilibrium (**Figure 1**). Neglect any frictional resistance.          **(12)**
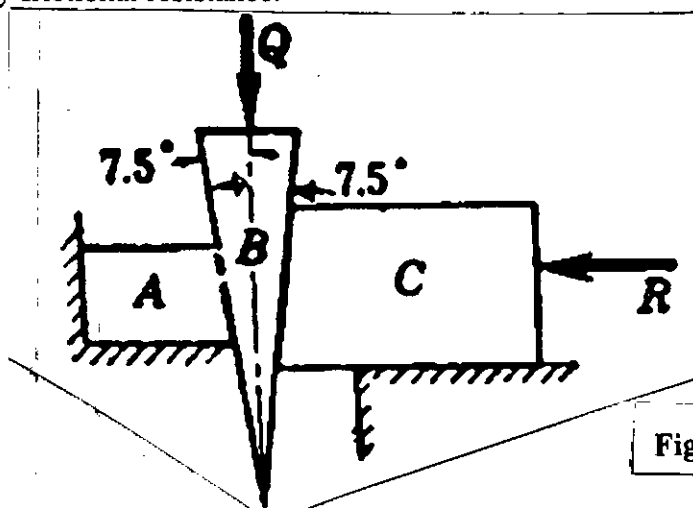


Figure 1 for Question 1 (a)

(b) Four forces act on bolt A as shown as shown in **Figure 2**. Determine the resultant of the forces on the bolt. If we remove the support of the bolt, how can we keep the system of forces in equilibrium condition?       **(8)**
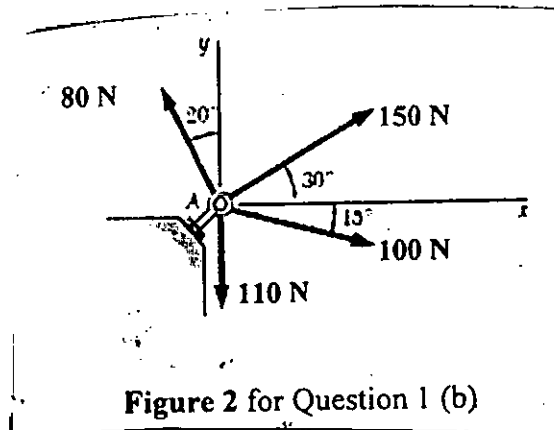


Figure 2 for Question 1 (b)

(c) Determine the components of the forces acting on each member of the frame shown as shown in **Figure 3**.       **(15)**
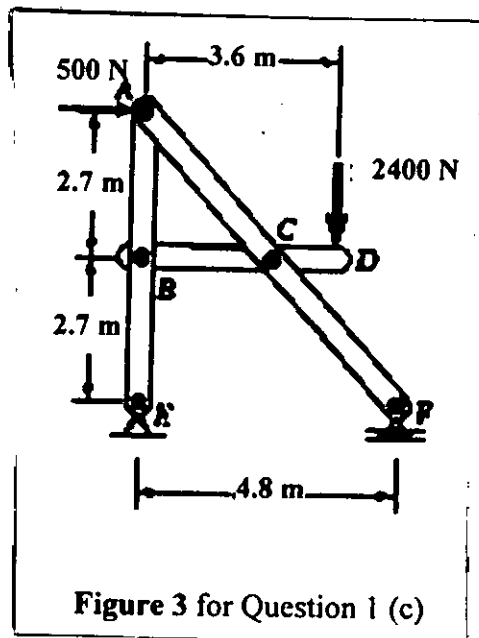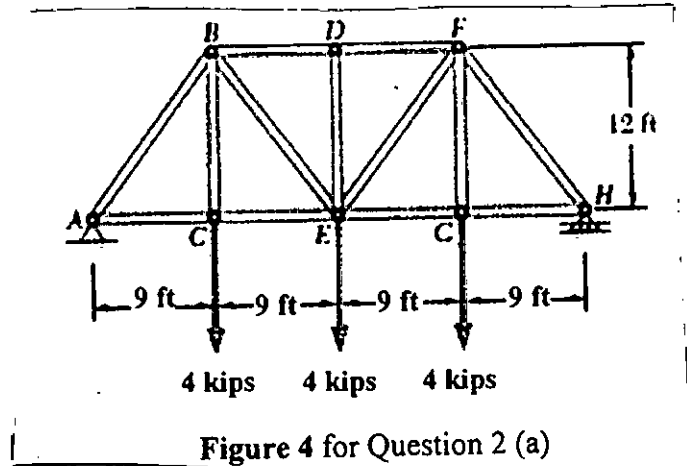
Figure 3 for Question 1 (c)

## WRE 101

2. (a) Determine the force in each member of the Pratt bridge truss shown in **Figure 4**. State
   whether each member is in tension or compression.      **(25)**



**Figure 4** for Question 2 (a)

(b) A wheel with a diameter of 8-m is acted upon by a force $F$ (see **Figure 5**), which
tends to push the wheel over the obstruction at $A$. At the instant the wheel is about to
move, calculate the magnitude of the force $F$ if $\alpha = 30°$. Assume self-weight of the wheel
is 2500 N.      **(10)**



**Figure 5** for Question 2 (b)
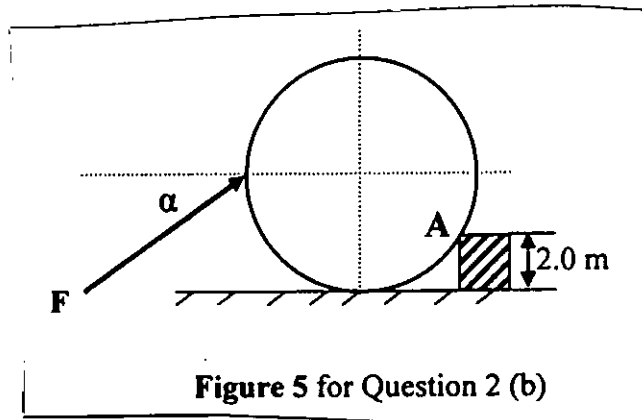
3. (a) Blocks A and B weigh 400 lb and 200 lb, respectively. They rest on an inclined plane
   as shown in **Figure 6**, which is attached to the perpendicular post on the inclined surface.
   A force $P$, parallel to the plane is holding everything at rest. Determine the tension on the
   cable and the value of $P$.      **(15)**



Contd .......... P/3

**Figure 6** for Question 3 (a)
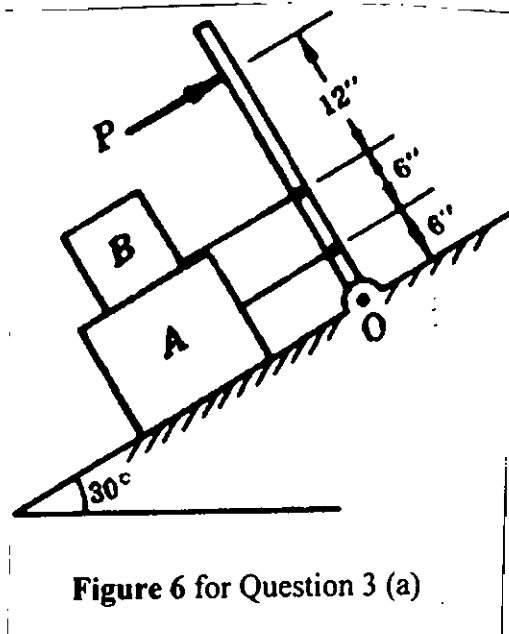
# WRE 101

Contd ... Q. No. 3

(b) A wire weighing 8 oz. per ft is strung between two supports, 250 ft apart. One support is 15 ft higher than the other, and the sag, measured from the lower support is 5 ft. Compute the tension at each support and the length of wire. **(15)**

(c) Why frictional resistance is important in solid mechanics? How do the static and kinetic friction work on a surface? **(5)**

4. (a) The cable $A$ and $B$ terminate on a pole as shown in **Figure 7** and exerts forces in the horizontal plane at $C$. The guy cable CD makes an angle $45°$ and the anchor at $D$ is to be so located that the poll will have only a compressive load. Let $\theta = 40°$, A = 4500 lb, B = 9000 lb and CE = 25 ft. Find the value of angle $\alpha$ and tension in the cable. **(15)**



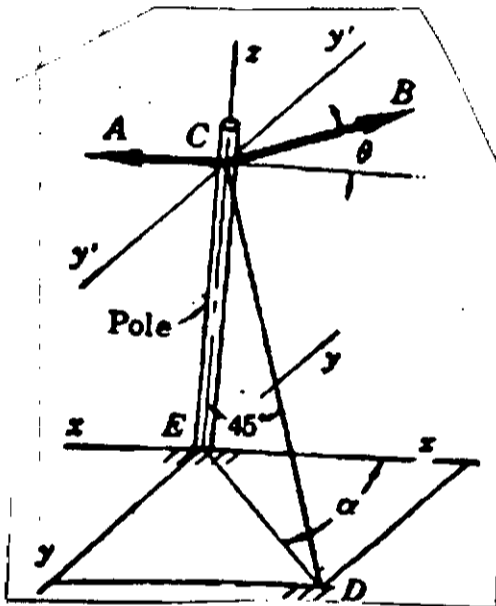Figure 7 for Question 4 (a)

(b) The bodies $A$ and $B$ are connected with a cable over two fixed cylinders as shown in **Figure 8**. Given that $W_B = 300$ N, $\theta = 60°$ and the frictional coefficients for cylinders and inclined surface are $1/\pi$ and 0.3, respectively. If the body $B$ is impending down the inclined plane, calculate the weight of $A$. **(10)**
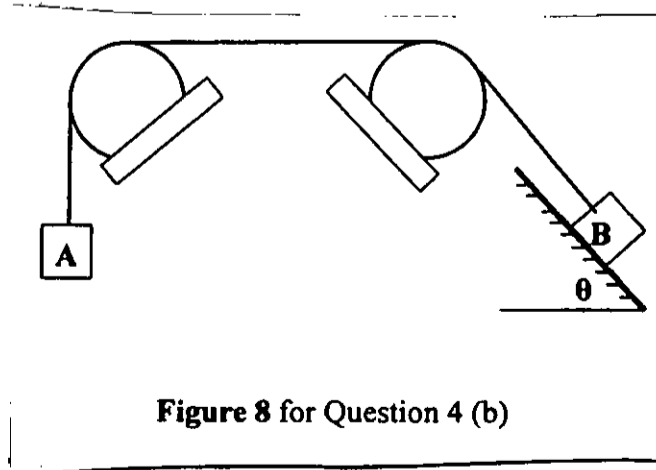


Figure 8 for Question 4 (b)

# WRE 101

**Contd ... Q. No. 4**

(c) Determine the force P to cause motion to impend if the coefficient of friction for both blocks and the plane as shown in Figure 9 is 0.25. The force P and the ropes are parallel to the plane and the pulley is frictionless.                                                                    **(10)**
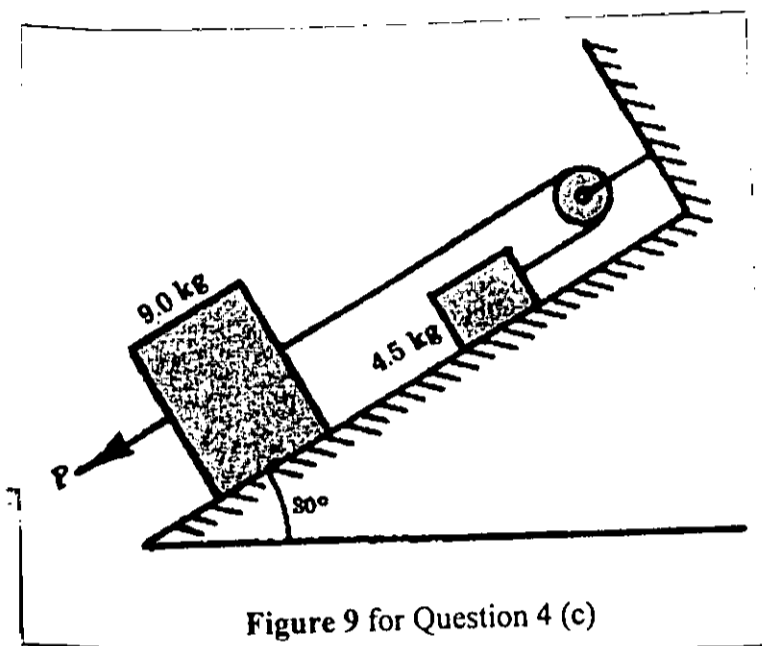


**Figure 9** for Question 4 (c)

## SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Determine the location of the centroid of the plane area shown in Figure 10.                         **(10)**

   (b) The shade for a wall-mounted light is formed from a thin sheet of translucent plastic. Determine the surface area of the outside of the shade, knowing that it has the parabolic cross section shown in Figure 11.                                                                                **(10)**

   (c) A scratch awl has a plastic handle and a steel blade and shank (Figure 12). Given that the density of plastic is 1030 kg/m$^3$ and of steel is 7860 kg/m$^3$, locate the center of gravity of the awl.                                                                                            **(15)**

6. (a) Using the parallel-axis theorem, determine the product of inertia with respect to the centroidal x and y axes shown in Figure 13.                                                                 **(15)**

   (b) The cross section of a concrete dam is shown in Figure 14. For a 1.0 ft wide dam section determine (i) the magnitude and point of application of the resultant force due to self weight exerted by the ground on the base AB of the dam (ii) resultant of the pressure forces exerted by the water on the face BC of the dam.                                                    **(20)**

# WRE 101

7. (a) A 10-kg block is attached to the rim of a 300 mm radius disk as shown in Figure 15. Given that spring BC is unstretched when $\theta = 0°$, determine the position or positions of equilibrium, and state in each case whether the equilibrium is stable, unstable, or neutral. **(15)**

(b) In Figure 16, block A starts from rest at t = 0 and moves downward with a constant acceleration of 6 in/s$^2$. Given that block B moves up with a constant velocity of 3 in./s, determine (i) the time when the velocity of block C is zero, (ii) the corresponding position of block C. **(20)**

8. (a) The 12 lb block B starts from rest and slides on the 30 lb wedge A, which is supported by a horizontal surface (Figure 17). Neglecting friction, determine (i) the acceleration of the wedge, (ii) the acceleration of the block relative to the wedge. **(15)**

(b) In the engine system shown in Figure 18, $l$ = 160 mm and $b$ = 60 mm. Knowing that crank AB rotates with a constant angular velocity of 1000 rpm clockwise, determine the velocity of the piston P and the angular velocity of the connecting rod when $\theta = 60°$. **(20)**

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Figure 10 for Question 5(a)



$y = kx^2$

Figure 11 for Question 5(b)



Figure 12 for Question 5(c)

Figure 13 for Question 6(a)



Figure 14 for Question 6(b)
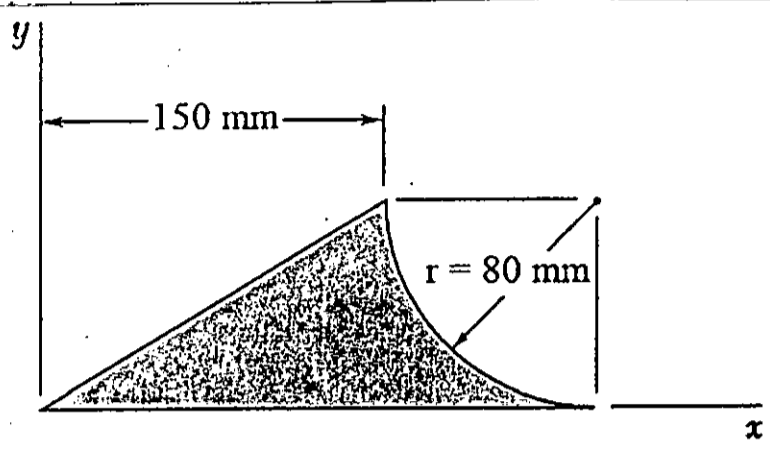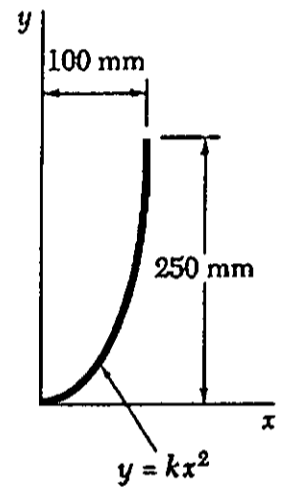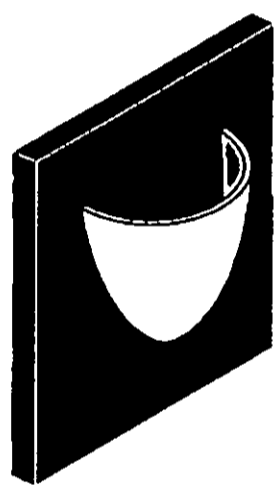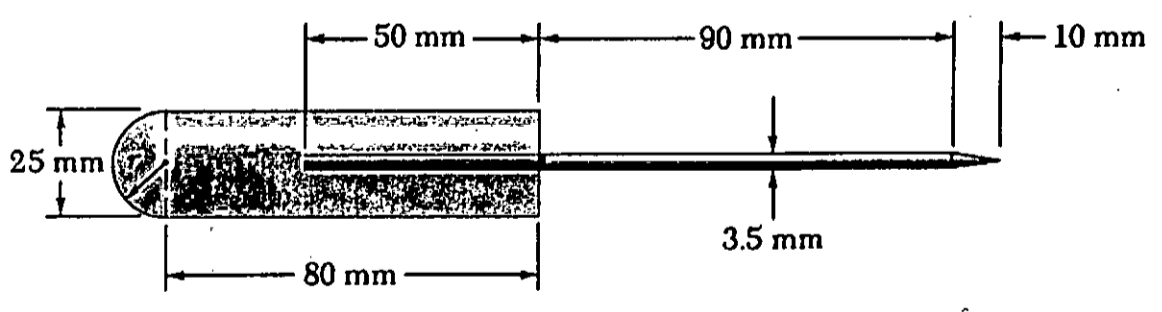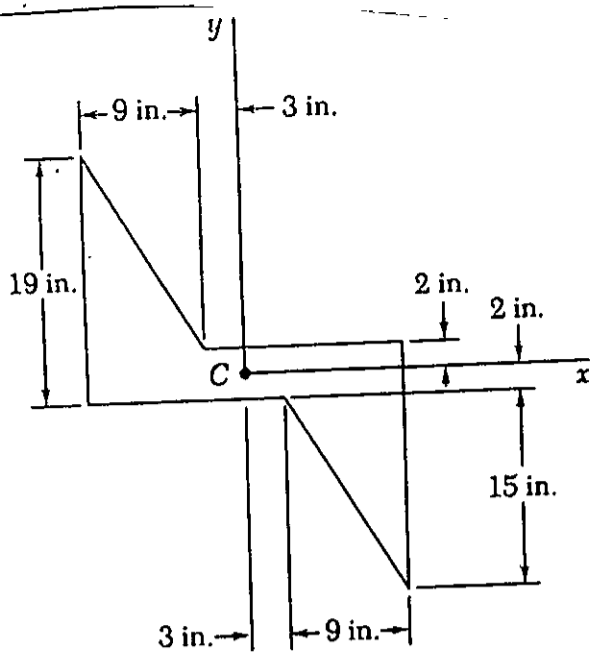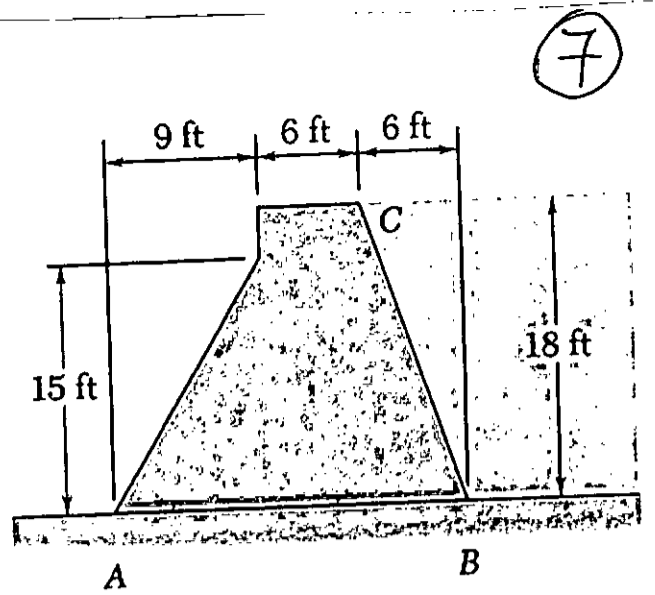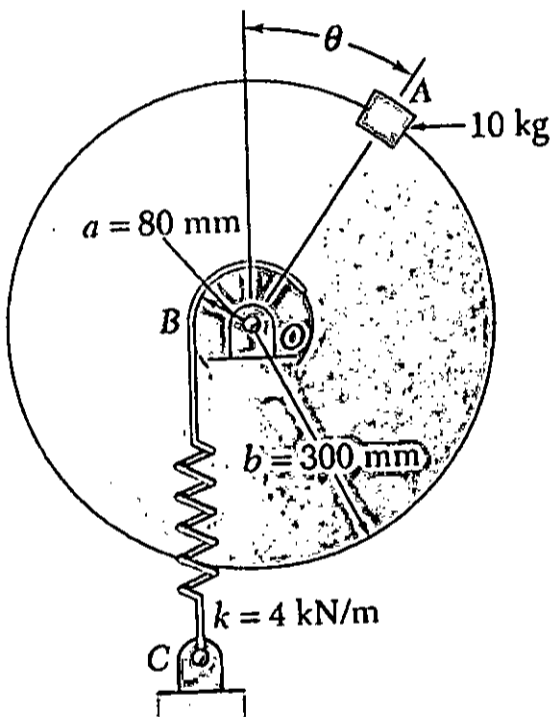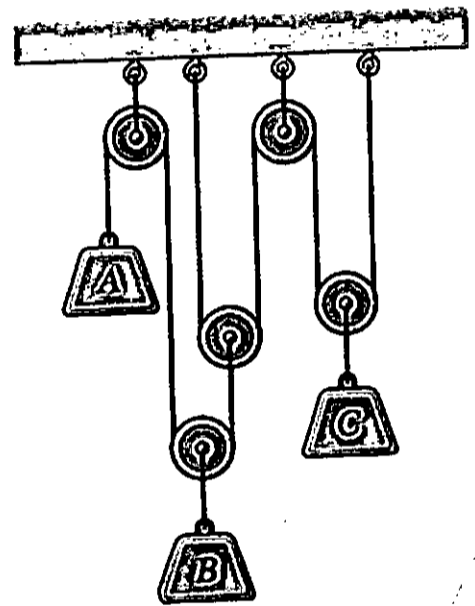


Figure 15 for Question 7(a)



Figure 16 for Question 7(b)
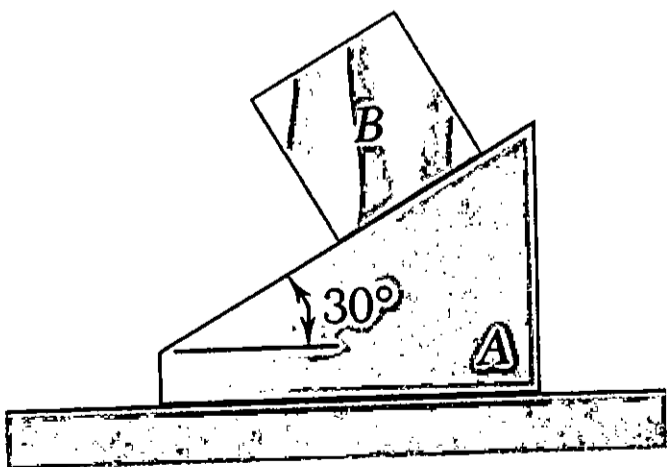


Figure 17 for Question 8(a)
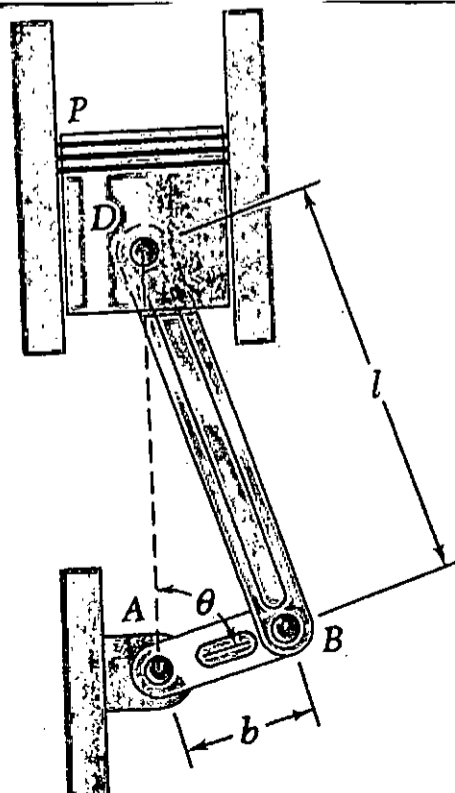


Figure 18 for Question 8(b)

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Sc. Engineering Examinations 2021-2022

Sub : **MATH 131** (Differential Calculus and Integral Calculus)

Full Marks : 210                              Time : 3 Hours

The figures in the margin indicate full marks.

Symbols used have their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

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## SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Discuss the continuity and differentiability of the function $f(x)$, at $x=0$ and $x=1$. **(13)**

$$f(x) = \begin{cases} x^2 + 1, & x \le 0 \\ x, & 0 < x < 1 \\ 1/x, & x \ge 1 \end{cases}$$

Also, sketch the graph of the function.

(b) Evaluate: $\displaystyle\lim_{x \to 0} (1 + x)^{\frac{1}{x}}$. **(10)**

(c) Use numerical evidence to make a conjecture about the value of $\displaystyle\lim_{x \to 2} \frac{x^3 - 2x^2}{x - 2}$.

Verify your result graphically. **(12)**

2. (a) State and prove Leibnitz's theorem. **(13)**

(b) Consider $f(x) = \dfrac{1}{1 - x}$, find Taylor's polynomial $P_5(x)$ at $x = 0$. Compute $P_5(0.1)$ and

compare with $f(0.1)$. Also find the error bound for $P_5(0.1)$. **(12)**

(c) If $y = \cos\{\ln(1 + x)\}$ then prove that $(1 + x)^2 y_{n+2} + (2n + 1)(x + 1)y_{n+1} + (n^2 + 1)y_n = 0$. **(10)**

3. (a) A closed cylindrical can is to hold 1 liter ($1000\ cm^3$) of liquid. How should we choose

the height and radius to minimize the amount of material needed to manufacture the can? **(15)**

(b) Consider the function $f(x) = x^{\frac{2}{3}}$. Verify Rolle's theorem for the function $f(x)$ on the

interval [–2, 2]. **(8)**

(c) Verify Euler's theorem for $Z = \dfrac{x^{\frac{1}{3}} + y^{\frac{1}{3}}}{x^{\frac{1}{2}} + y^{\frac{1}{2}}}$. **(12)**

# MATH 131/WRE

4. (a) Show that the equation of tangent line to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at the point $(x_1, y_1)$ is $xx_1 + yy_1 + g(x + x_1) + f(y + y_1) + c = 0$. **(11)**

(b) Find the pedal equation of the polar curve $r^n = a^n \cos n\theta$. **(12)**

(c) The graph of the vector equation $\mathbf{r} = 2 \cos t\, \mathbf{i} + 3 \sin t\, \mathbf{j}$, $(0 \le t \le 2\pi)$ is an ellipse. Find the curvature of the ellipse at the endpoints of the major and minor axes. **(12)**

## SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Compute the following integrals:

(a) $\int \dfrac{8x^3 + 6x^2 + 4x + 2}{7x^2 + 5x + 3}\, dx$ **(12)**

(b) $\int \dfrac{2 \cos x + 3 \sin x}{4 \cos x - 5 \sin x}\, dx$ **(11)**

(c) $\int_0^{\frac{\pi}{2}} \log \sin x\, dx$ **(12)**

6. (a) Derive a reduction formula for $\int \sin^m x \cos^n x\, dx$ and hence evaluate $\int \sin^2 x \cos^3 x\, dx$. **(12)**

(b) Evaluate $\lim\limits_{n \to \infty} \left[ \left(1 + \dfrac{1}{n^2}\right)^{\frac{2}{n^2}} \left(1 + \dfrac{2^2}{n^2}\right)^{\frac{4}{n^2}} \cdots\cdots \left(1 + \dfrac{n^2}{n^2}\right)^{\frac{2n}{n^2}} \right]$ using definite integrals. **(12)**

(c) Evaluate the improper integral, $\int_0^\infty \dfrac{x}{x^4 + 1}\, dx$. **(11)**

7. (a) Prove that, $2^{2p-1}\Gamma(p)\,\Gamma\left(p + \dfrac{1}{2}\right) = \sqrt{\pi}\,\Gamma(2p)$. **(12)**

(b) Find the value of the integral, $\int_0^\infty \sqrt{y}\, e^{-y^3}\, dy$. **(11)**

(c) Find the area of a loop of the curve $a^2 y^2 = x^2(a^2 - x^2)$. **(12)**

8. (a) Find the surface area of the solid generated by revolving of $x = a(\theta - \sin\theta)$, $y = a(1 - \cos\theta)$ about $x$-axis. **(20)**

(b) Evaluate the triple integral, $\int_0^1 \int_{y^2}^{\sqrt{y}} \int_0^{y+z} xy\, dx\,dz\,dy$. **(15)**

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## SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Define forced vibrations. In this vibration, what happens when the natural frequency of the oscillating body is equal to the frequency of the applied force?      **(10)**

    (b) The hub of a wheel is attached to a spring with spring constant $k$ and negligible mass (see Figure 1(b)). The wheel has radius $R$ and total mass $M$. The mass of the spokes is negligibly small. The wheel rolls without slipping, i.e., the wheel translates by the same distance that its circumference rotates. The center of mass of the wheel oscillates (simple harmonic motion) in the horizontal direction about its equilibrium point $x = 0$.      **(25)**
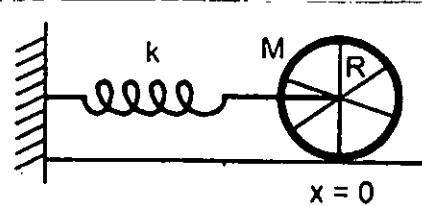


Figure for question no. 1b

    (i) Find an expression for the total energy in terms of $k$, $M$, $R$ and $x(t)$. Since the spokes have negligible mass, you may assume that the moment of inertia for rotation about the axle is $MR^2$.

    (ii) Using conservation of energy, derive the different equation of motion of the wheel.

    (iii) Find the angular frequency of small oscillations about equilibrium. Given, $k = 300$ N/m and $M = 10$ kg.

2. (a) What are damped oscillations? Write down the differential equation of motion for a damped oscillator. Solve it to obtain an expression for the displacement in the case of damped oscillatory motion. Discuss the effect of damping on the natural frequency of an oscillator.      **(27)**

    (b) A damped oscillator having mass 200 g. force constant 80 N/m and damping constant 70 g/s. How long does it take for the amplitude of the damped oscillations to drop to half its initial value? Calculate the mean life time of the oscillation.      **(8)**

## PHY 107/WRE

3. (a) What are the reverberation and reverberation time? On what factors do they depend? **(7)**

(b) What is a stationary wave? Show that in the case of stationary wave, no energy is transferred across any section of the medium. **(20)**

(c) A string vibrates according to the equation, $y = 5 \sin\left(\frac{\pi}{4}x\right)\cos(30\,\pi t)$, where $x$ and $y$ are in centimeters and $t$ is in seconds. What is the amplitude and velocity of the component waves whose superposition can give rise this vibration? Find the distance between consecutive antinode for this vibration. **(8)**

4. (a) Describe the construction and working principle of a platinum resistance thermometer. Give some advantages and disadvantages of this thermometer. **(25)**

(b) The resistance $R_t$ of a platinum wire at temperature $t$ °C, measured on the gas scale, is given by $R_t = R_0 (1 + \alpha t + \beta t^2)$ where $\alpha = 3.8 \times 10^{-3}/°C$ and $\beta = -5.6 \times 10^{-7}/°C^2$. Calculate the temperature on the platinum scale when the temperature on the gas scale is 200 °C. **(10)**

### SECTION – B
There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) Show that the mean free path of gas molecule is given by $\lambda = \dfrac{RT}{\sqrt{2}\left(\pi d^2\right)PN_A}$, where symbols have their usual meanings. **(12)**

(b) Derive the Van der Waal's equation of state and give its graphical representation. **(20)**

(c) The diameter of a gas molecule is $3.2 \times 10^{-10}$ m. The number of molecules at 0 °C is $2.69 \times 10^{25}$ per m$^3$. Calculate the mean free path of the gas molecules. **(3)**

6. (a) State the first law of thermodynamics? Show that the $P$-$V$ curve for adiabatic process is $\gamma$ times steeper than that for the isothermal process. **(10)**

(b) Show that the change in entropy does not depend on the path taken in a thermodynamic process. **(7)**

(c) Prove that the changes in entropy of a perfect gas is given by, **(12)**

$$S_2 - S_1 = C_V \ln\frac{P_2}{P_1} + C_P \ln\frac{V_2}{V_1},$$

where symbols have their usual meanings.

(d) A Carnot cycle operates between source and sink temperatures of 250 °C and –15 °C. If the system receives 90 kJ from the source, calculate the (i) efficiency of the system (ii) net work transfer and (iii) heat released into the sink. **(6)**

## PHY 107/WRE

7. (a) Distinguish between constructive and destructive interference of light. Why is a soap bubble spread over the surface of water appears colored in sunlight. **(10)**

(b) Write down the theory of interference and hence find the condition of path difference for constructive and destructive interference of light. **(18)**

(c) A glass wedge of angle 0.01 radian is illuminated by monochromatic light of wavelength 600 nm falling normally on it. At what distance from the edge of the wedge will the $10^{th}$ fringe be observed by reflected light? **(7)**

8. (a) What is meant by polarization of light? Write down the methods by which light can be polarized? **(8)**

(b) Discuss how light can be polarized by reflection and refraction. Explain the mechanism of polarization by reflection and refraction by any suitable theory. **(20)**

(c) A 30 cm long tube filled with a solution containing 15 gm of cane sugar per 100 cc is placed in the path of a plane polarized light. Find the angle of rotation of the plane of polarization. Specific rotation of sugar is 66.5°. **(7)**

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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA
L-1/T-1   B. Sc. Engineering Examinations 2021-2022
Sub : **CHEM 115** (Chemistry-I)
Full Marks : 210                          Time : 3 Hours
The figures in the margin indicate full marks.
USE SEPARATE SCRIPTS FOR EACH SECTION

## SECTION – A
There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Explain Hess's law of thermochemistry with two applications.                          **(10)**

   (b) Differentiate enthalpy and internal energy. Construct two calorimeters to measure a reaction's enthalpy and internal energy change.                          **(15)**

   (c) How is the caloric value of food calculated? Use the following data to compare the quality of fuels.                          **(10)**

|                  | Approximate elemental composition (Mass%) | | | Fuel Value (kJ/g) |
|------------------|------|------|------|-------------------|
|                  | C    | H    | O    |                   |
| Wood             | 50   | 6    | 44   | 18                |
| Anthracite coal  | 82   | 1    | 2    | 31                |
| Bituminus coal   | 77   | 5    | 7    | 32                |
| Charcoal         | 100  | 0    | 0    | 34                |
| Crude Oil        | 85   | 12   | 0    | 45                |
| Gasoline         | 85   | 15   | 0    | 48                |
| Natural gas      | 70   | 23   | 0    | 49                |
| Hydrogen         | 0    | 100  | 0    | 142               |

2. (a) Define concentration cells. Develop an equation for the calculation of emf of a concentration cell.                          **(10)**

   (b) Construct a silver/silver chloride reference electrode and define its components. Discuss the working principle of the reference electrode.                          **(15)**

   (c) Write down the steps for balancing the following redox reaction in a basic solution and identify oxidizing and reducing agents.                          **(10)**

   $$MnO_4^- \text{ (aq)} + Br^- \text{ (aq)} \rightarrow MnO_2 \text{ (aq)} + BrO_3^- \text{ (aq)}$$

3. (a) Use the concept of conjugate acids and bases to define strong acids and weak acids.                          **(10)**

   (b) Construct a set of curves showing the effect of acid strength on the characteristics of the titration when a strong base titrates weak acid. Interpret the reasons for the variation of curves.                          **(15)**

   (c) Provide stepwise calculation to determine the pH of the solution formed when 10.0 mL of 0.05 M NaOH is added to 40.0 mL of 0.025 M benzoic acid ($K_a = 6.3 \times 10^{-5}$).                          **(10)**

4. (a) Write the relation of Gibbs free energy with enthalpy and entropy. Identify entropy-driven process and enthalpy-driven process.                          **(10)**

   (b) Explain the effect of increasing the concentration of a nonvolatile solute in water on the properties of dilute solutions: (i) vapor pressure, (ii) freezing point, (iii) boiling point, (iv) osmotic pressure. Draw diagrams to illustrate these phenomena.                          **(15)**

# CHEM 115/WRE

**Contd ... Q. No. 4**

(c) A lithium salt used in lubricating grease has the formula $LiC_nH_{2n+1}O_2$. The salt is soluble in water to 0.036 g per 100 g at 25 °C. The osmotic pressure is 57.1 torr. Assuming that molality and molarity in such a dilute solution are the same and that the lithium salt is completely dissociated, determine an appropriate value of $n$ in the salt formula. The atomic weight of Li is 7 g/mol. $LiC_nH_{2n+1}O_2$ dissociates as $Li^+$ and $C_nH_{2n+1}O_2^{\cdot}$ in aqueous solution. **(10)**

## SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) (i) Write down the general form of the Schrodinger equation and define each of the terms in it. (ii) What are the conditions for acceptable solutions? (iii) Mention the importance of this equation. **(10)**

(b) Explain that Broglie's and Bohr's concepts are in agreement with each other? How does Heisenberg's uncertainty principle contradict the Bohr's atomic theory? **(15)**

(c) The work function of cesium metal is $3.42 \times 10^{-19}$ J. (i) Calculate the minimum frequency of light required to release electrons from the metal. (ii) Calculate the kinetic energy of the ejected electron if light of frequency $1.00 \times 10^{15}$ $s^{-1}$ is used for irradiating the metal. **(10)**

6. (a) State the underlying themes of Valence Bond Theory (VBT). Describe the bonding on a given N atom in dinitrogen difluoride, $N_2F_2$, using Valence Bond Theory. **(10)**

(b) Explain the following data in terms of the Molecular Orbital Diagram: **(15)**

|  | $N_2$ | $N_2^+$ | $O_2$ | $O_2^+$ |
|---|---|---|---|---|
| Bond Energy (kJ/mol) | 945 | 841 | 498 | 623 |
| Bond Length (pm) | 110 | 112 | 121 | 112 |

(c) Use partial orbital diagrams to illustrate the mixing of atomic orbitals of the central atom(s) leads to the hybrid orbitals in each of the following: (i) Beryllium fluoride, $BeF_2$ (ii) Xenon tetrafluoride, $XeF_4$. **(10)**

7. (a) Draw the molecular shapes and predict the bond angles (relative to the ideal angles) of **(10)** (i) $CS_2$; (ii) $PbCl_2$; (iii) $COCl_2$; (iv) $SF_2$; (v) $BrF_5$.

(b) Explain the bonding in HF and NO in terms of Molecular Orbital Theory (MOT). **(15)**

(c) Describe the bonding in the $SiF_4$ molecule, using valence bond theory. **(10)**

8. (a) Define Bioaccumulation. Explain the toxicity of heavy metals in the human body. How can you reduce heavy metals toxicity? **(10)**

(b) All halogens are soluble in water but the extent to which they react with water varies. Justify the statement. **(15)**

(c) Explain why $Li^+$ ion has less conductivity compared to other ions in Group I? **(10)**

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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Sc. Engineering Examinations 2021-2022

## Sub : HUM 111 (English)

Full Marks : 140                               Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

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### SECTION – A

There are **FOUR** questions in this section. Answer **Q. No. 1** and any **TWO** from the rest.

1. (a) Explain with reference to the context any one of the following:          **(8)**

    (i) "There lay a young man, fast asleep, sleeping so soundly, so deeply, that he was far, far away from them both, oh! so remote, so peaceful. He was dreaming."

    (ii) "Capital punishment kills a man at once, but lifelong imprisonment kills him slowly."

    (b) Answer any one of the following:                                          **(10)**

    (i) To what extent was Mrs. Matilda Loisel responsible for her own suffering?

    (ii) How was the lawyer changed from an ordinary man into a man of spiritual perfection?

    (c) Answer any one of the following:                                          **(12)**

    (i) Why did Mrs. Sheridan and Jose refuse to stop the garden party?

    (ii) What were the terms and conditions of the bet accepted by the banker and the lawyer?

    (iii) Give a description of the night on which the banker proceeded to kill the lawyer.

    (iv) Why did Mrs. Forestier fail to recognize her friend?

    (v) What impression do you get about Mr. Loisel as a husband?

2. Recast and correct any ten of the following sentences:                        **(20)**

    (i) They made less mistakes with the new calculating machine.

    (ii) I was in a dilemma about what to have for dinner.

    (iii) The jury is arguing among itself.

    (iv) Both of the mouse is underfed.

    (v) It is Robinsons whom, I feel certain, are to come.

    (vi) Illiteracy is when a man cannot read or write.

    (vii) They can't hardly speak English.

    (viii) He had a need and interest in athletics.

    (ix) He is something better today.

    (x) Dhaka is larger than any city in Bangladesh.

    (xi) He is as tall as, if not taller, than the teacher.

    (xii) We shall combine the three Departments into one.

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3. (a) Give the meanings of any ten of the following words (one meaning for one word). **(10)**

       Alleviate, brittle, cryptic, divulge, flounder, hubbub, obstinate,

       rancor, sneak, tepid, vestige, zealot.

   (b) Make sentences with any ten of the following words: **(10)**

       Admonish, cabal, deprecate, feud, grouchy, hilarious, indictment,

       meddle, ominous, ratify, sporadic, wrath.

4. Write a précis of the following passage with a suitable title: **(20)**

Authority from the twentieth century onwards is nowhere what it was before. In certain spheres it has disappeared altogether. Public opinion no longer feels bound to enforce morality as it did by means of spoken disapproval and informal penalties. Fathers have ceased to rule the family, employers no longer enjoy the status masters; the upper class have ceased to inspire imitation as models of correct behavior; school masters and university dons no longer dominate the minds of the young. Things once considered inherently wrong are tolerated where they are thought to do no manifest harm: fornication, adultery, homosexuality, abortion, nudity and erotica flourish openly where they were legally penalized or forced to be discreetly veiled. Adolescents, who were once subject to the edicts of parental jurisdiction, live as they please, often earning as much as their fathers, and enjoying more legal rights at eighteen than their grandparents possessed at any time during their lives. But this decline of authority in recent times has not necessarily meant a rise in liberty. For the concept of authority is not something which stands opposed to that of freedom, although some unreflective people may think it does. Authority is really a special kind of power which rests on the consent and belief of those who live under it. Without such free assent there can be no such thing as authority. And when authority is removed, it is only too likely that it will be followed either by rule of naked power or by anarchy.

### SECTION – B

There are **FOUR** questions in this section. Answer **Q. No. 5** and any **TWO** from the rest.

5. Read the following passage carefully and answer the questions that follow. **(30)**

Cinema is full of contradictions. It is high-tech and old-fashioned at the same time. Today's films are full of digital sound and computer-generated special effects. Yet they are still stored on celluloid film, the basis of which is more than 100 years old. They are also displayed with projectors and screens that seem to belong to our great grandparent's generation. Now that we are in the second century of cinema, there are moves to bring the medium right up to date. This will involve revolutionising not just how films are made but also how they are distributed and presented. The aim is not only to produce and prepare films digitally, but to be able to send them to movie theatres by digital, electronic means. High-resolution digital projectors would then show the film. Supporters say this will make considerable savings at all stages of this chain, particularly for distribution.

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### Contd ... Q. No. 5

With such a major technological revolution on the horizon, it seems strange that the industry is still not sure what to call itself. This may appear a minor point, but the choices, 'digital' cinema and 'electronic' cinema (e-cinema), suggest different approaches to, and aspects of, the business. Digital cinema refers to the physical capture of images; e-cinema covers the whole chain, from production through post-production (editing, addition of special effects and construction of soundtrack) to distribution and projection. And what about the effects of the new medium? The main selling point of digital cinema is the high resolution and sharpness of the final image. But those who support the old-fashioned approach to film point to the celluloid medium's quality of warmth. A recurring criticism of video is that it may be too good: uncomfortably real, rather like looking through an open window. In 1989, the director of the first full-length American digital high-definition movie admitted that the picture had a 'stark, strange reality to it'.

Even the money-saving aspect of e-cinema is doubted. One expert says that existing cinemas will have to show the new material and not all of them will readily or rapidly furnish themselves with the right equipment. 'E-cinema is seen as a way of saving money, because print costs a lot,' he says. But for that to work, cinemas have to be showing the films because cinemas are the engine that drives the film industry.' This view has prompted some pro-digital entrepreneurs to take a slightly different approach. HD Thames is looking at reinventing the existing cinema market, moving towards e-theatre, which would use digital video and projection to present plays, musicals and some sporting events to the public. This is not that different from the large-screen TV system that was set up in New York in 1930, and John Logie Baird's experiments with TV in the late 1920s and early 30s.

### Questions:

    (a) Explain the inconsistencies in present films.

    (b) How can the medium of cinema be updated?

    (c) What is the dominant feature of digital cinema?

    (d) Write about the main concern with e-cinema.

    (e) Give an appropriate title to the passage and justify it.

    (f) Give the meanings of the following words as used in the passage.

        Contradictions, furnish, revolutionising, recurring, approach

6. (a) Suppose you bought some printers from Jenin Hardware Ltd. for your office. However, after shipment, you found that some of the printers were badly damaged. Now, write a claim letter to the Sales Manager of Jenin Hardware Ltd. (Full Block)    **(10)**

    (b) Write phonetic transcription of the following words (any five)    **(10)**

        Bat, mother, seed, king, path, that

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7. (a) Write a dialogue between you and your friend about the causes of inflation.  **(10)**

   (b) Write a short essay on any one of the following topics.  **(10)**

     (i) The Scenario of Science Education in Bangladesh

     (ii) Fear of Missing out on Social Media


8. (a) Transform the following sentences as directed (any five).  **(10)**

     (i) Besides being thrown into jail, he was heavily fined. (Compound)

     (ii) He liked my suggestion. (Complex)

     (iii) Why worry about what people say? (Assertive)

     (iv) He was too angry to talk to her. (Complex)

     (v) The money which he gave me was not useful to me. (Simple)

     (vi) Nothing else travels as fast as light. (Superlative)

   (b) Write short notes on any two of the following.  **(10)**

     (i) Vowel and consonant sounds

     (ii) Components of a paragraph

     (iii) Different types of reports

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