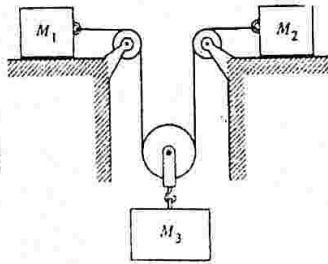


PHY101 (Mechanics): 1st Mid-semester Examination

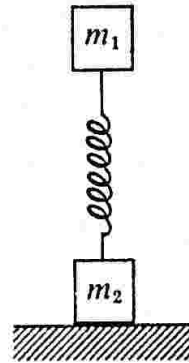
Duration: 60 minutes; Maximum marks: 20

1. Blocks of masses $M_1 = 5 \text{ kg}$, $M_2 = 3 \text{ kg}$ and $M_3 = 3 \text{ kg}$ are connected to a system of strings and pulleys (see figure below). The strings are massless and inextensible, and the pulleys are massless and frictionless.
- (a) What is the relation between the accelerations of the three masses?
 - (b) Find the acceleration of M_1 if the coefficient of friction between the table and the blocks is 0.1. Use $g = 10 \text{ m/s}^2$.
 - (c) How much is the tension in the string?

[2+3+2]



(a) Figure for problem 1.



(b) Figure for problem 3.

2. A particle moves in a plane with constant radial velocity $\dot{r} = 4 \text{ m/s}$ and constant angular speed 2 rad/s , as viewed from an inertial frame S . We study this motion in a reference frame S' that is rotating counter-clockwise with constant angular speed $\omega_0 = 3 \text{ rad/s}$. The origins of the two frames coincide, and the particle was at origin at time $t = 0$. Calculate the following quantities in frame S' at $t = 5 \text{ s}$:
- (a) Magnitudes of radial and tangential components of velocity.
 - (b) Magnitudes of radial and tangential components of acceleration.

[3+3]

3. A system is composed of two blocks of masses m_1 and m_2 connected by a massless spring of spring constant k , as shown in the figure above. Initially, m_1 is pressed down so that the spring is compressed to a length of $2l/3$, where l is the unstretched length. The mass m_1 is then released.
- (a) Find the expression for the maximum allowed value k_0 of the spring constant if the mass m_2 was to never leave the ground?
 - (b) Suppose $k = 2k_0$, find the expression for maximum height achieved by the CM of this system.

[3+4]

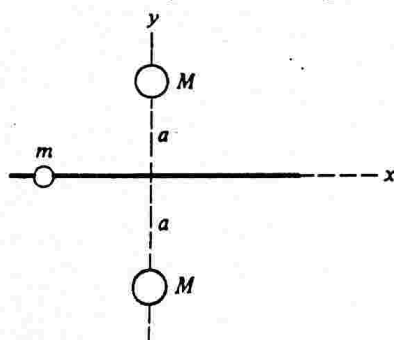
PHY101 (Mechanics): 2nd Mid-semester Examination

Duration: 60 minutes; Maximum marks: 20

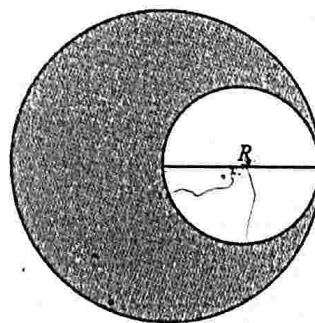
1. A rocket of initial mass M_0 ejects its burnt fuel at a constant rate $|dM/dt| = \mu$, and at a speed v_0 relative to the rocket.
 - (a) Find the expression for the initial upward acceleration of the rocket.
 - (b) If $v_0 = 200$ m/s and $M_0 = 1000$ kg, how many kg of fuel must be ejected per second to give an initial upward acceleration of $2g$ to the rocket?

[Be careful with the signs while solving this problem.] [3+2]

2. A bead of mass m slides on a frictionless rod along x-axis. The rod is equidistant from two spheres, each of mass M , fixed at locations $(0, a)$ and $(0, -a)$ (as shown below), and attract the bead gravitationally.
 - (a) Express the potential energy of the bead in terms of x .
 - (b) Bead is released at $x = -3a$ with velocity v_0 towards the origin. Find the speed of the bead as it passes the point $(0, 0)$.[3+3]



(a) Figure for problem 2.



(b) Figure for problem 3.

3. Consider a solid disk of mass M and radius R . A circular cavity of diameter R is created leading to the shape shown in the figure above. Find the moment of inertia about an axis perpendicular to the disk and passing through, (i) the center of the original disk and (ii) the centre of the cavity. [2+2]

4. A physical pendulum is made of a uniform disk of radius $R = 14$ cm and mass $M = 0.4$ kg suspended from a rod of negligible mass. The distance from the pivot to the center of the disk is L . What value of L makes the period a minimum? What is the value of this minimum period in seconds? *[$L < R$ is also allowed. Use $g = 10$ m/s².]* [3+2]

PHY101 (Mechanics): End-semester Examination; Part B

Duration (Part A + Part B): 180 minutes; Maximum marks: 40

1. Two blocks of masses 9 kg and 1 kg, hang from the ends of a string that passes around a pulley of mass 40 kg and radius 0.5 m ($I_p = \frac{1}{2}MR^2$). The system is released from rest and the pulley starts rotating without slipping against the string.
 - (a) Write down the Newton's equations for the two masses.
 - (b) What is the acceleration of the 9 kg mass?
 - (c) What is the angular velocity of the pulley after the 9 kg mass has dropped by 2 m?
 - (d) What are the tensions in the two parts of the string?

[2+3+3+2]
2. Consider a potential energy function, $U(x) = \epsilon \left[\frac{1}{2}(x - x_0)^4 - 4(x - x_0)^2 \right]$.
 - (a) Find the values of x where the potential is minimum.
 - (b) Find the minimum value of the potential.
 - (c) Find the frequency of small oscillations about the minimum for a mass m .

[2+2+2]
3. A child's hoop of radius R and mass M rolls in a straight line with velocity v . Its top is given a light tap with a stick at right angle to the direction of motion. The impulse of the tap is I . Assuming that the gyroscope approximation holds, and neglecting friction with the ground in comparison to the impulse force, find the angle by which the direction of the line of rolling changes after the tap. What is the condition on the peak force exerted during the impulse for the gyroscope approximation to hold?

[4+2]
4. Consider a ladder leaning against a frictionless wall. If the coefficient of friction between the ground and the ladder is μ , find the smallest angle the ladder can make with the ground without slipping.

[4]
5. Train A of proper length L_0 moves eastwards with speed $v = 0.8c$ and train B of proper length $2L_0$ moves westwards with speed $v = 0.8c$ as observed in the ground frame. How much time does it take for the trains to pass each other in, (a) A's frame, (b) B's frame? Passing interval is defined as the time between the front ends of the trains coinciding and the back ends coinciding. (c) In which frame is time interval for passing larger?

[3+3+1]
6. An object of mass 0.2 kg is hung from a spring with $k = 80$ N/m. The object is subjected to a resistive force $-bv$, where v is the velocity and $b = 4$ Nm⁻¹sec.
 - (a) Write down the differential equation for the oscillator.
 - (b) Find the quality factor (Q value) of the oscillator.
 - (c) Find the period of oscillations.
 - (d) The object is now subjected to a driving force $F = F_0 \sin(\omega t)$. Derive the expression for the amplitude of forced oscillations in the steady state. what is the amplitude of forced oscillations if $F_0 = 2$ N and $\omega = 30$ rad/sec?

[1+1+2+3]

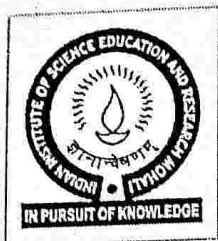


CHM101: 1st Mid Semester Exam

(Total Points 20)

Please write brief and to-the-point answers.

1. Draw the radial probability function for 4s and 3d orbitals. Explain from this why d-orbitals are considered less penetrating? (4)
2. What is the basic idea of Allred-Rochow electronegativity? Electron affinity of fluorine is lesser than that of chlorine. Explain the reason. (4)
3. For the molecule Sulphur trioxide, explain the hybridization of sulphur and what will be the shape of the molecule? Draw the Lewis dot structure of PF_5 explaining the hybridization of phosphorus (4)
4. Use Slater's rule to determine the Z_{eff} for the 3p electron of scandium (at. no. 21) (2)
5. Draw a qualitative molecular orbital diagram of CO. What causes the HOMO of the molecule to be more carbon characterized? (4)
6. What will be number of unpaired electrons in the ground state of B_2 ? Show work (2)



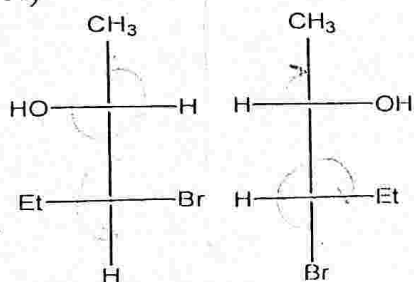
CHM101: 2nd Mid Semester Exam

(Total Points 20)

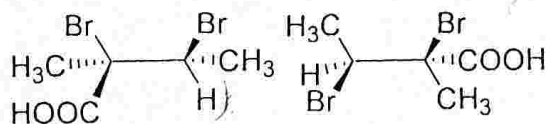
Please write brief and to-the-point answers.

- For which member of the following pairs of complex ions would Δ_o be greater and why?
A) $[\text{MnF}_6]^{2-}$ and $[\text{ReF}_6]^{2-}$ B) $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{Fe}(\text{CN})_6]^{3-}$ (3)
- What will be the d-orbital splitting in an octahedral complex when it undergoes z-out distortion? What is the primary reason of such distortion? (3)
- Predict whether the system will be Jahn-Teller distorted or not, $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Co}(\text{CN})_6]^{4-}$. Show complete work to get the credit. (3)
- Explain why the color of a $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ solution is very pale? (2)
- When Fe^{2+} is mixed with thiocyanate solution, a deep red colored solution is generated. What is the origin of such color? (2)
- What is the difference between an enantiomer and diastereomer? What relationship the following molecules bear? Show work. (5)

A)



B)



- Show a molecule where chirality can arise despite the lack of a chiral center. (2)



Final Exam- CHM101, 2019

Total marks: 70

Part A (14 marks)- Fill in the blanks with appropriate answer/answers. Write down **ONLY** the answer (just the words rather copying the entire question) in the first page of your answer booklet.

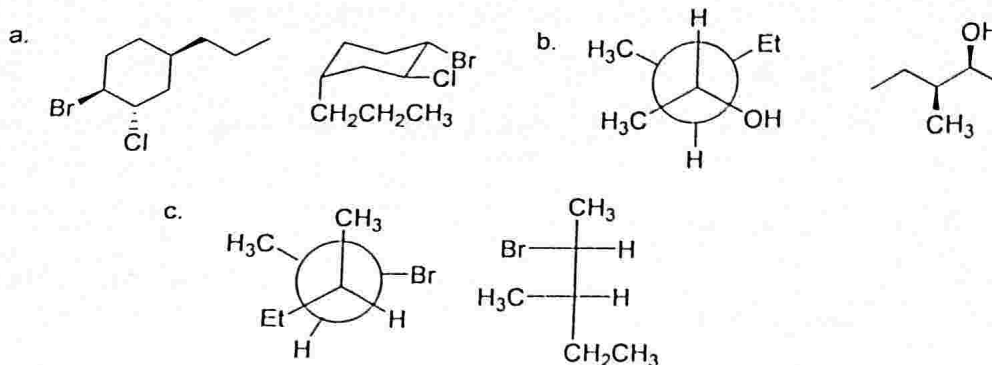
1. Oxidation state for iron in $K_3Fe[Fe(CN)_6]$ is _____. 1
2. According to Allred Rochow scale electronegativity is directly proportional to _____. 1
3. The ground spin state for the B_2 molecule is _____. 1
4. The lowest unoccupied molecular orbital in a square planar geometry of a coordination complex is primarily a d-orbital, _____. 1
5. The main mechanism that relaxes the Laporte rule is _____. 1
6. Arrange ligands in **increasing** field strength. I^- , 1,10- phenanthroline, CO , NH_3 2
7. The electronic configuration of Ni^{3+} is _____. 1
8. +4 oxidation state of Pd is often inaccessible due to _____. 1
9. The rule that states that small cation will polarize large anion better is _____. 1
10. The HOMO of CO is a _____ centric MO. 1
11. Following Slater's rule the effective nuclear charge on 3s electron of Na is _____. 1
12. The color for a coordination complex that is observed is _____ to what it absorbs. 1
13. Shape of the molecule SF_4 is _____. 1

$1s^2 2s^2$

3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca						

Part B (56 marks):

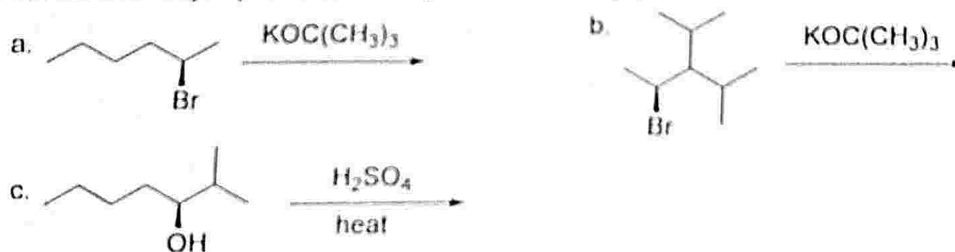
1. Identify whether the following pairs of compound represents enantiomers, diastereomers or identical molecule. Show work and do not simply guess. (4.5)



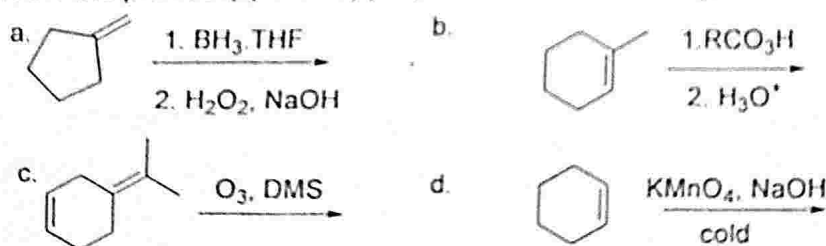
2. Draw the Newman projection of the following substituted cyclohexane (left-side molecule). Provide R, S nomenclature for all the stereocenters present in the right-side molecule. (5)



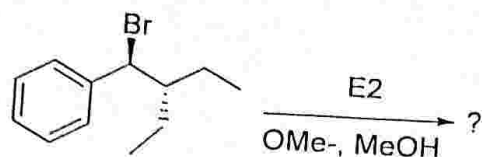
3. Predict the major product for E2/E1 reactions. (3)



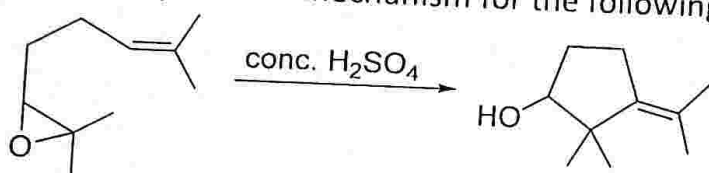
4. Draw the product(s) with appropriate stereochemistry, when required. (6)



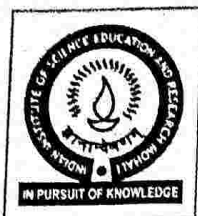
5. Explain what do you mean by kinetically and thermodynamically controlled product? If the reaction is run for longer time which one of these two will be predominant? (3)
6. The following alkyl bromide gives only one product. Draw mechanistically, the products for the following reactions with proper drawing of stereochemistry? (3)



7. Explain the following facts writing the product with appropriate stereochemistry (4)
- A) Treating (Z)-2-butene with OsO₄ in pyridine and the NaHSO₃ in water gives a diol that is optically inactive and can't be resolved.
- B) Treating (E)-2-butene with OsO₄ in pyridine and the NaHSO₃ in water gives a diol that is optically inactive but can be resolved into enantiomers.
8. Propose a plausible mechanism for the following reaction. (3)



9. Predict the product when benzoquinone is treated with excess butadiene. (2)
-
- Benzoquinone (a six-membered ring with two double bonds and two carbonyl groups) reacts with 1,3-butadiene. The product is a Diels-Alder adduct where the butadiene has added across the double bonds of the benzoquinone ring.
10. State what kind of solvent will accelerate S_N2 reaction? In an S_N1/E1 reaction, what you will do to favor the elimination product? (2)
11. Solutions of [Cr(OH₂)₆]³⁺ ions are pale blue-green but the chromate ion, CrO₄²⁻ is intense yellow in color. Characterize the origins of the transitions and explain the relative intensities. (3)
12. Draw the radial probability function for 4d and 5s orbitals (4)
13. Carbon monoxide is a very poor Lewis base towards H⁺, but it is an excellent Lewis base toward Ni. Rationalize this fact. (3)
14. Explain the bonding of SF₆ in the light of valence bond theory. (2)
15. In crystal field theory approximation, a charged ligand will feel more electrostatic interaction with the metal center. Yet, OH⁻ is a weaker field ligand compared to H₂O. Rationalize this anomalous fact. (3)
16. Chromium(II) fluoride and manganese(II) fluoride both have a central metal ion surrounded by six fluoride ligands. The Mn-F bond lengths are equidistant, but four of the Cr-F distances are long and two are short. Provide explanation. (3)
17. While BeCO₃ is unstable, decomposition temperature for MgCO₃ and CaCO₃ are 350 and 900 °C respectively. Can you explain this trend (Clue: CO₂ is a byproduct for this reaction)? (2.5)



MTH101, Symmetry

Exam I, September 13, 2019

Duration: 1 hour.

15 Points.

Note: Calculators or electronic devices of any kind are not permitted.

Questions

- (1) (3 points) Compute the determinant of the following matrix:

$$\begin{bmatrix} 2 & -1 & 7 & 1 \\ -1 & 2 & 3 & 2 \\ 3 & -5 & 2 & 3 \\ 2 & -1 & 2 & 3 \end{bmatrix}$$

- (2) (a) (1 point)

$$A = \begin{bmatrix} 2 & -1 & 2 \\ 1 & 3 & 2 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 5 \\ 2 & 3 \\ 4 & 0 \end{bmatrix}$$

Compute the product AB .

- (b) (2 points)

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 1 & -1 \\ 1 & 0 & -1 \\ 1 & 1 & 1 \end{bmatrix}$$

Compute the product $A^{250} \cdot B \cdot A$.

(Note: $A^{250} = A \cdot A \cdots A \cdot A$ (multiplied 250 times).)

- (3) (3 points) Compute the inverse of the following matrix (any method):

$$\begin{bmatrix} 2 & 2 & 5 \\ 0 & 3 & 2 \\ -1 & 1 & -1 \end{bmatrix}$$

- (4) (3 points) Solve the following system of equations using Cramer's rule:

$$X + 2Y - 3Z = -1$$

$$3X - Y + 4Z = 2$$

$$-X - Y + Z = 3$$

(Note: No points will be awarded if Cramer's rule is not used.)

- (5) (3 points) Solve the following system of equations:

$$2X - Y + 4Z - W = 3$$

$$X - Y + 3Z + 2W = 1$$

$$3X + Y + 2Z + 3W = -1$$

$$\begin{bmatrix} 2 & 2 & 5 & 1 & 0 & 0 \\ 0 & 3 & 2 & 0 & 1 & 0 \\ -1 & 1 & -1 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 5/2 & 1/2 & 0 & 0 \\ 0 & 3 & 2 & 0 & 1 & 0 \\ -1 & 1 & -1 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 5/2 & 1/2 & 0 & 0 \\ 0 & 3 & 2 & 0 & 1 & 0 \\ 0 & 2 & 3/2 & 1/2 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 5/2 & 1/2 & 0 & 0 \\ 0 & 1 & 2/3 & 0 & 1/3 & 0 \\ 0 & 2 & 3/2 & 1/2 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 11/6 & 1/6 & 0 & 0 \\ 0 & 1 & 2/3 & 0 & 1/3 & 0 \\ 0 & 0 & -1 & 1/2 & -1/3 & 1 \end{bmatrix}$$

-1



MTH101, Symmetry

Exam II, October 14, 2019

20 Points.

Duration: 1 hour.

Note: Calculators or electronic devices of any kind are not permitted.

- (1) (4 points) Let $T : \mathbb{R}^4 \rightarrow \mathbb{R}$ be defined by $T(\mathbf{x}) = A\mathbf{x}$ where A is the matrix

$$A = \begin{bmatrix} 2 & -1 & 3 & 5 \end{bmatrix}_{1 \times 4}.$$

Find a basis for $\ker(T)$. Prove that it is a basis for this space.

- (2) (4 points) Let V be a finite dimensional vector space over \mathbb{R} . Show that any injective linear transformation $T : V \rightarrow V$ is also surjective. (Hint: Pick a basis of V and look at its image under T .)

- (3) (4 points) Let $T : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ be a linear transformation such that

$$T\left(\begin{bmatrix} 2 \\ -3 \end{bmatrix}\right) = \begin{bmatrix} 2 \\ 3 \\ -1 \end{bmatrix} \quad \text{and} \quad T\left(\begin{bmatrix} 1 \\ 2 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ -2 \\ -1 \end{bmatrix}$$

Compute $T\left(\begin{bmatrix} 1 \\ 0 \end{bmatrix}\right)$.

- (4) (2 points each) Define any two of the following three notions:

- (a) Span of a set.
- (b) Dimension of a vector space.
- (c) Isomorphism of vector spaces.

- (5) (4 points) In the vector space \mathbb{R}^3 , consider the vectors

$$\mathbf{v}_1 = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} \quad \mathbf{v}_2 = \begin{bmatrix} 2 \\ -1 \\ 2 \end{bmatrix} \quad \mathbf{v}_3 = \begin{bmatrix} 5 \\ 5 \\ -1 \end{bmatrix} \quad \mathbf{v}_4 = \begin{bmatrix} 3 \\ -4 \\ -5 \end{bmatrix}$$

Is \mathbf{v}_4 in $\text{span}(\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3)$? (You must prove your answer. No points will be awarded if the answer is not justified.)

\rightarrow a, b, c $\begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} + \begin{bmatrix} 2 \\ -1 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix} \neq \begin{bmatrix} 3 \\ -4 \\ -5 \end{bmatrix}$



MTH101, Symmetry

End-semester examination
November 25, 2019

Duration: 3 hours.

40 Points.

- Calculators or electronic devices of any kind are not permitted.
- All vector spaces are assumed to be over \mathbb{R} (the field of real numbers).
- For any integer n , \mathbb{R}^n will denote the space of $n \times 1$ (column) matrices with entries in \mathbb{R} .

(1) (1 point each) Answer the following questions:

- Let V be a vector space and let $T : V \rightarrow V$ be a linear transformation. What is an eigenvector of T ?
- What is a diagonalizable matrix?
- What is the direct sum of two vector spaces? Explain the addition and scalar multiplication operations on the direct sum.
- State the Rank-Nullity Theorem.
- Let V and W be vector spaces. Let $T : V \rightarrow W$ be a linear transformation. Let $\mathcal{B}_1, \mathcal{B}_2$ be ordered bases of V and let $\mathcal{C}_1, \mathcal{C}_2$ be ordered bases of W . Complete the following formula:

$$M_{\mathcal{C}_1}^{\mathcal{B}_1}(T) = \underline{\hspace{2cm}} \cdot M_{\mathcal{C}_2}^{\mathcal{B}_2}(T) \cdot \underline{\hspace{2cm}}$$

- (2) Let V be a 5-dimensional vector space and let W be a 3-dimensional vector space. Let $\phi : V \rightarrow W$ be a surjective linear transformation. Let U be a subspace of W such that $\dim(U) = 2$. Let $\tilde{U} \subset V$ be defined by

$$\tilde{U} = \{v \in V : \phi(v) \in U\}.$$

- (2 points) Show that \tilde{U} is a subspace of V .
 - (3 points) Compute $\dim(\tilde{U})$.
- (3) (4 points) Let $A, B \in M_{2 \times 2}(\mathbb{R})$. Suppose that A and B are diagonalizable and that their characteristic polynomials are equal. Prove that there exists an invertible 2×2 matrix P such that $A = P^{-1}BP$.

- (4) (4 points) Let V be the subspace of \mathbb{R}^4 defined as $V = \text{span}\{v_1, v_2\}$ where

$$v_1 = \begin{bmatrix} 2 \\ 0 \\ 4 \\ 1 \end{bmatrix} \quad \text{and} \quad v_2 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 3 \end{bmatrix}.$$

Handwritten calculations and notes in the bottom right corner, including a small diagram of a vector space and some algebraic expressions.

Let $\phi : V \rightarrow V$ be a linear transformation such that

$$\phi(\mathbf{v}_1) = \begin{bmatrix} 5 \\ 1 \\ 9 \\ 5 \end{bmatrix} \quad \text{and} \quad \phi(\mathbf{v}_2) = \begin{bmatrix} 4 \\ 2 \\ 6 \\ 7 \end{bmatrix}.$$

Compute all the eigenvalues and eigenvectors of ϕ .

- (5) (3 points each) Which of the following matrices are diagonalizable? Justify your answer in each case:

$$A = \begin{bmatrix} -1 & 3 \\ -3 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$$

- (6) (4 points) Let V be a 2-dimensional vector space. Let $\phi : V \rightarrow V$ be a linear transformation such that $\phi(\phi(\mathbf{v})) = 2\mathbf{v}$ for every $\mathbf{v} \in V$. Prove that ϕ is diagonalizable.
- (7) (4 points) Let V be a 5 dimensional vector space. Let $\phi_1 : V \rightarrow \mathbb{R}^2$ and $\phi_2 : V \rightarrow \mathbb{R}^2$ be linear transformations. Prove that there exists $\mathbf{v} \in V$ such that $\mathbf{v} \neq \mathbf{0}$ and $\phi_1(\mathbf{v}) = \phi_2(\mathbf{v}) = \mathbf{0}$.
- (8) (3 points) Let V be an ~~3~~ 3-dimensional vector space. Let $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ be a basis of V . Prove that $\{\mathbf{v}_1 + \mathbf{v}_2, \mathbf{v}_2 + \mathbf{v}_3, \mathbf{v}_3 + \mathbf{v}_1\}$ is also a basis of V .
- (9) (5 points) Let V_1, V_2, V_3 and V_4 be finite dimensional vector spaces. Let $\phi_1 : V_1 \rightarrow V_2$, $\phi_2 : V_2 \rightarrow V_3$ and $\phi_3 : V_3 \rightarrow V_4$ be linear transformations. Suppose that the following four conditions hold:
- (a) ϕ_1 is injective.
 - (b) $\text{im}(\phi_1) = \ker(\phi_2)$.
 - (c) $\text{im}(\phi_2) = \ker(\phi_3)$.
 - (c) ϕ_3 is surjective.

Prove that $\dim(V_1) + \dim(V_3) = \dim(V_2) + \dim(V_4)$.

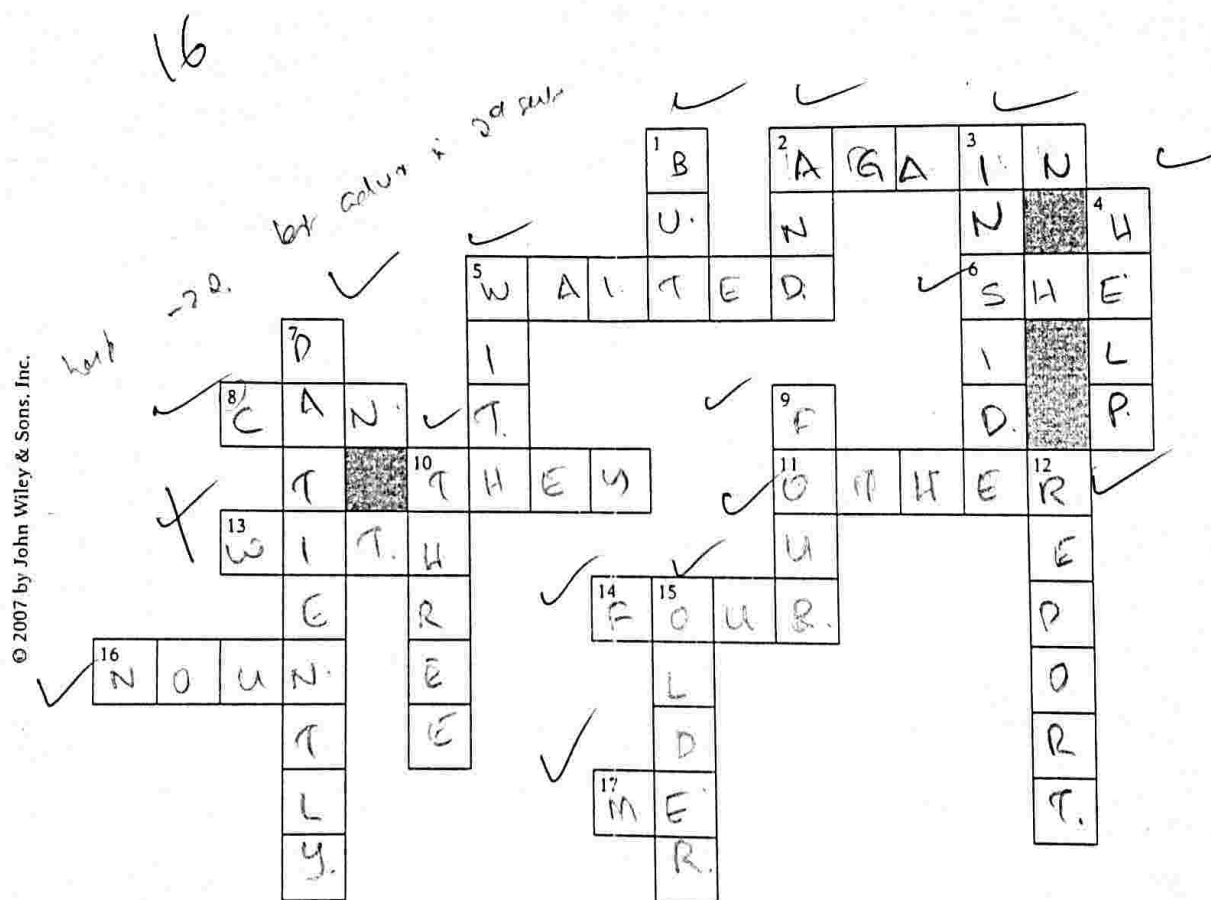
Name MEENAKSHI . GANESH Date 23/8/19 Period

MS19021

MS19021

REVIEW ACTIVITY 3 CHECKING OUT THE TWO SENTENCES (PARTS OF SPEECH) (Continued)

2, 8, 13.



Sentence 1: They waited patiently inside the arena to meet star of the game, but she went out the other door.

Sentence 2: You can help these older people with the heavy packages and then report to me again, Rich.

Observe your surrounding area. Construct 5 sentences with special emphasis on punctuation marks.

1. (In Sentence 1 use a colon) (Justify the use of colon) (1)

Sentence : Every student in the class always ^{↓ has} three things with them: a pen, a paper, and mobile phone.

Justify Here colon ':' is used to list some things i.e., pen, paper and mobile. which are the three things mentioned in the beginning of the sentence.

2. (In Sentence 2 use semicolon) (Justify the use of semicolon) (1)

Sentence Vaasu came to class with her legs plastered; she fell off the stairs

Justify Here a semicolon ';' is used to connect two independent sentences, but the second is the just reason for the first sentence.

3. (In Sentence 3 use apostrophe) (Justify the use of apostrophe) (1)

Sentence ~~Athul isn't writing~~

I am using Athul's pen to write the quiz.

Justify : Here apostrophe is used to show possession. The pen I am using belongs to Athul ~~ie, the pen is A.~~

4. (In Sentence 4 use comma and a coordinating conjunction) (Underline the coordinating conjunction. Justify the use of comma) (1)

Sentence

¶ There are blue, black, and red bags ~~in front of me~~. kept along the aisle of the classroom.

Justify Here comma is used to separate a list of things.

5. (In Sentence 5 use a conjunctive adverb with punctuation mark) (Underline the conjunctive adverb and justify the use of punctuation mark) (1)

Sentence ~~She~~ Aaravi loves to sing; however, she is not a good singer.

Justify Here 2 separate sentences are joined using a conjunctive adverb. The first ^{clause} part, 'Aaravi loves to sing' itself has a meaning and this is connected to another clause 'she is not a good singer' using 'however'.

4/5

1. He is not worried despite of the fact that he has five daughters.

Corrected Sentence: He is not worried despite the fact that he has five daughters.

Justification:

The word 'despite' doesn't take the preposition 'of' along with it.

2. Either John or his friends has informed the police.

Corrected Sentence: Either John or his friends have informed the police.

Justification: When either is used in the sentence, out of the 2 nouns, the subjects, the verb must agree with the second subject ~~the subject~~. Hence, since 'friends' is a plural subject, the verb should also be plural ('have' instead of 'has').

3. (a) Bosco showed up for work two hours late.

Part of Speech identification: noun

- (b) He will have to work until midnight.

Part of Speech identification: verb.

4. (a) Write a sentence where an adverb qualifies another adverb. Underline both the adverbs.

Answer: My grandmother ^{says} said that swiftly charms me.

- (b) Write a sentence where an adverb qualifies another adjective: Underline the adverb and the adjective.

Answer: My friend said that she resembles the brilliant dancer who passed away last week.

5. Use the word 'piecemeal' in a sentence of your own. State the meaning of the word.

Piecemeal (Meaning): Doing a work bit by bit, ~~showing~~ not in a systematic manner.

Sentence:

Since he did his project in a piecemeal manner, it failed to get the approval.



IISER Mohali

Second Mid Semester Exam
HSS 101 A – Language Skills

15/10/2019

8:30 am – 09:30 am

LH-5

Marks: 15

1. Construct sentences with the following words and state the meanings of the words. (2)
(a) Discrete, Discreet (b) Eminent, Imminent
(b) Ordinance and Ordnance (d) Envious and Envable
2. Explain these terms (verbatim, fabrication, scientific misconduct, conducive environment) drawing on P. Balaram's article titled "Plagiarism: A Spreading Infection." (2)
3. this is a lovely cake she exclaimed where did you get the recipe (1)
(Punctuate and justify each punctuation mark)
4. Panda eats, shoots, and leaves. (1)
Panda eats shoots and leaves. (Identify the parts of speech in each of these sentence and explain the difference in meaning)
5. They returned to campus on time, but the security personnel did not allow them to enter the campus. (Convert this sentence into a complex sentence) (1)
6. "We've all got both light and dark inside us. What matters is the part we choose to act on. That's who we really are. Happiness can be found, even in the darkest of times." (Identify the sentence structure of each sentence) (1)
7. Construct a complex-compound sentence. Underline and identify the type of conjunctions used. 222 100 (2)
8. Write a short paragraph based on the following scenes from Charlie Chaplin's *Modern Times*. [Write complete grammatical sentences] (5)
(a) The opening scene (collage)
(b) The factory scene (assembly line of production)
(c) The roller-skating scene (musical disjunction)
(d) The restaurant scene (nonsense song)
(e) The background score and the final scene (theme music, *Smile*)

She decided to come to the class, but she woke up
too late, although she knew that she still have to
walk to school. a

PART A

(HSS 101- A Language Skills)

29/11/2019

(9am -10:30am)

1. Precis Writing

(5 marks)

It is physically impossible for a well-educated, intellectual, or brave man to make money the chief object of his thoughts just as it is for him to make his dinner the principal object of them. All healthy people like their dinners, but their dinner is not the main object of their lives. So all healthy minded people like making money ought to like it and enjoy the sensation of winning it; it is something better than money.

A good soldier, for instance, mainly wishes to do his fighting well. He is glad of his pay—very properly so and justly grumbles when you keep him ten years without it—till, his main mission of life is to win battles, not to be paid for winning them. So of clergymen. The clergyman's object is essentially baptize and preach not to be paid for preaching. So of doctors. They like fees no doubt—ought to like them; yet if they are brave and well-educated the entire object to their lives is not fees. They on the whole, desire to cure the sick; and if they are good doctors and the choice were fairly to them, would rather cure their patient and lose their fee than kill him and get it. And so with all the other brave and rightly trained men: their work is first, their fee second—very important always; but still second. (232 words)

232 $\times \frac{1}{11}$ 4 $\frac{5}{11}$ 232 $\times \frac{1}{11}$ 4 $\frac{5}{11}$ 232 $\times \frac{1}{11}$ 4 $\frac{5}{11}$

2. Descriptive Writing (in not more than 300 words)

Summarize P. Balaram's article "Plagiarism: A Spreading Infection." (3 marks)

3. Based on Mihir Mahidhar's *Zero*, discuss the appropriateness of the title to the theme of the short film. (3 marks)

4. Describe the cartoon in your own words

(4 marks)



Comprehension

Marie was born in 1867 in Warsaw, Poland, where her father was a Professor of Physics. At an early age, she displayed a brilliant mind and a blithe personality. Her great exuberance for learning prompted her to continue with her studies after high school. She became disgruntled (angry), however, when she learned that the university in Warsaw was closed to women. Determined to receive a higher education, she defiantly left Poland and in 1891 entered the Sorbonne, a French university, where she earned her master's degree and doctorate in physics.

Marie was fortunate to have studied at the Sorbonne with some of the greatest scientists of her day, one of whom was Pierre Curie. Marie and Pierre were married in 1895 and spent many productive years working together in the physics laboratory. A short time after they discovered radium, Pierre was killed by a horse-drawn wagon in 1906. Marie was stunned by this horrible misfortune and endured heart-breaking anguish. Despondently she recalled their close relationship and the joy that they had shared in scientific research. The fact that she had two young daughters to raise by herself greatly increased her distress.

Curie's feeling of desolation finally began to fade when she was asked to succeed her husband as a physics professor at the Sorbonne. She was the first woman to be given a professorship at the world-famous university. In 1911 she received the Nobel Prize in chemistry for isolating radium. Although Marie Curie eventually suffered a fatal illness from her long exposure to radium, she never became disillusioned about her work. Regardless of the consequences, she had dedicated herself to science and to revealing the mysteries of the physical world.

5. Why did Marie become disgruntled (angry)? (1 mark)
6. What misfortune (bad luck) struck Marie in 1906? (1 mark)
7. How did Marie Curie's feeling of desolation (unhappiness) finally begin to fade? (1 mark)

PART B

(HSS 101- A Language Skills)

29/11/2019

(10:30 am -12noon)

PLEASE DO NOT WRITE ANYTHING ON THE QUESTION PAPER

(a) Vocabulary building

Answer only in BLOCK LETTERS.

(½ mark each = 3 marks)

8. One who is very hard to please
9. A group of followers hired to applaud at a performance
10. A person appointed by two parties to solve a dispute
11. Spoken or done without preparation
12. Profane talk
13. One who studies the elections and trends in voting

(b) Construct sentences with these words/idioms and mention the meaning in bracket:

(½ mark each = 7 marks)

14. When pigs fly
15. Infallible
16. All ears
17. Aviary
18. To hit the nail on the head
19. Jurisprudence
20. To blow the top
21. Impregnable
22. Once in a blue moon
23. Ephemeral
24. Panacea
25. Wet behind ears
26. Illegible
27. Die is cast

Correct the sentences, if incorrect. Justify your answer.

(1x10=10 marks)

28. Each of the suspected men were arrested.
29. He is Shakespeare of the country.
30. Hari is inferior than Ram in intelligence.
31. There are a lot of sheeps in campus.
32. The train left the station when I had arrived.
33. The sceneries here are very good.
34. The items I bought from the market are: apples and oranges.
35. If you had studied hard, you would get first class.
36. This is one of the most interesting novel I read this year.
37. I adviced her to go to the Health Centre.

Answer the following:

38. Comment on the function word *after* in each sentence (Parts of speech). **(4 marks)**

They arrived soon *after*.

They arrived *after* us.

They arrived *after* we had left.

The *after* effects of the drug are bad.

39. With an emphasis on subordinating and coordinating conjunctions, distinguish a compound sentence from a complex sentence. **(2 marks)**

40. The English live in England and speak English. Comment on the definite article and its omission in the words underlined. **(2 marks)**

41. Differentiate past perfect tense from present perfect tense with examples. **(2 marks)**

42. With an example, explain nouns in apposition. Comment on the punctuation mark used **(2 marks)**

X-----X