

Paper Code: 1114

Programme	Exam Code	Course Code
Master of Commerce (FYIP)	508301	FCOL-1102
Master of Science (Mathematics)(FYIP)	112411	FMAL-1102
Master of Science (Physics) (FYIP)	508601	FPHL-1102

Semester – I**Course Title: Communicative English – I****Time Allowed: 3 Hours****Max Marks: 35**

Note: Attempt five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 7 Marks. (5*7=35)

Section-A**Q1. Write down the meaning of the following words: (1 x 7=7)**

- | | | | |
|-----------|---------------|--------------|------------|
| i. Knotty | ii. Efface | iii. Grisly | iv. Barren |
| v. Dolt | vi. Inaudible | vii. Loutish | |

Q2. Write the correct usage of the following words: (1 x 7=7)

- | | |
|------------------------|----------------------------|
| i. New innovations | ii. Consensus of Opinion |
| iii. Entirely complete | iv. Past experience |
| v. At the near future | vi. Remember the fact that |
| vii. Frown to | |

Section-B**Q3. Write a letter to the editor of the local newspaper of your town concerning about "Bad roads in your locality" (1 x 7=7)****Q4. A popular music group is performing in your city. Write a report covering different aspects of the event. (1 x 7=7)****Section- C****Q5. For each sentence circle the continuing idea: (1 x 7=7)**

- The ancient Greeks and Egyptians knew a great deal about the movements of the Earth and the positions of the stars. Some people believe that this knowledge helped sailors from ancient Greece or Egypt to reach America over three thousand years ago.
- The workers are asking for a 20 percent wage increase, longer vacations, and better medical insurance. These demands may be too expensive for the company to agree to.
- In high school, students who have no interest in the subject often disturb the class. This makes it harder for students who really want to learn.
- To improve health care, the government would need to raise taxes by more than 10 percent. Such an increase now, six months before the next election, would be unpopular with most politicians.
- A number of developing countries have tried to introduce birth-control programs. These attempts have often failed because the family planning experts did not know enough about the lives and traditions of the people.
- The traffic was very slow on the interstate this morning. This made me thirty minutes late for my class.

vii. Tom's father did not get angry with him when Tom had an accident and wrecked the family car.

Q6. In the following sentences, circle the Cause and Effect Markers. Circle each cause and mark it with a C. Underline each effect and mark it with an E. (1 x 7=7)

- i. In the 1990s, world oil prices fell and stayed low. This brought about an improvement in the economies of countries that import oil.
- ii. On account of the bad weather, the baseball game has been canceled.
- iii. Two months ago, a large factory closed down. This resulted in fifteen hundred people losing their jobs.
- iv. The prices of new cars are forcing many people to keep their old cars longer than they used to.
- v. A lack of rain is creating problems for farmers. Their crops are not growing well.
- vi. Some human diseases have been associated with chemicals in the environment.
- vii. Because of a severe storm in the area, our plane was three hours late taking off.

Section-D

Q7. Complete the sentences with words from the list: (1 x 7=7)

symbol, flow, in succession, symbol, hardships, integrated, diversity, oppression, in transition, process

- i. The statue of Liberty may be the world's best-known _____ of freedom. For millions of immigrants, it signified the hope of a better future.
- ii. In late 1840s, the _____ of Irish immigrants into the United States became very strong.
- iii. You know that an immigrant family is becoming _____ into its new society if language shift takes place in its second or third generation.
- iv. Many immigrants to America left Europe to escape the religious _____ that caused friends and family members to suffer.
- v. Life in America had its own _____ for Irish immigrants in the 1850s. Because of anti-Irish prejudice, they had difficulties getting good jobs.
- vi. One feature of Indian society is the _____ of languages that are spoken there. The country has more than 1600 different languages.
- vii. For three years _____ in 1840s, a new disease destroyed the potatoes in Ireland.

Q8. Write the synonyms: (1 x 7=7)

- i. To keep something in good condition
- ii. The food the body needs
- iii. Big enough to be important
- iv. To have sufficient money
- v. To describe something as greater than it really is
- vi. Worldwide
- vii. Against the law

(For Reappear Candidates Only (2024-25))

Exam Code : 508601

Paper Code : 9116

Master of Science (Physics) (FYIP) (Semester-I)

Course Title: Organic Chemistry

Course Code: FPHL-1086

Time Allowed : 3 Hours

Max. Marks : 70

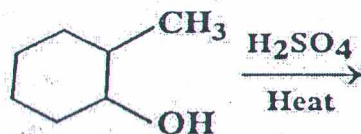
Note: Attempt five questions in all selecting at least one question from each section. The fifth question can be attempted from any section. Each question carries 14 marks.

Section – A

1. (a) What do you mean by hyperconjugation. Why it is called no bond resonance. Explain with suitable example relative stability of alkenes. (7)
- (b) Differentiate between electrophiles and nucleophiles, providing examples for each. Explain their importance in organic reaction with mechanism. (7)
2. (a) What are carbanion? Discuss its structure, generation and factors affecting generation of carbanion intermediate. (7)
- (b) Give the main point of the difference between resonance effect and inductive effect with suitable example. (7)

Section – B

3. (a) Describe the addition of hydrogen halides to alkenes. Explain both Markovnikov and anti-Markovnikov additions with mechanisms and suitable examples. (7)
- (b) How will you explain alkynes undergo nucleophilic addition reactions but alkene do not? and identify the reaction and write mechanism of following organic transformation. (7)



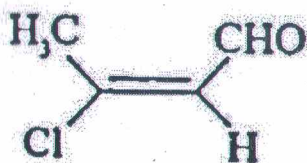
4. (a) Discuss with detailed mechanism : Birch reduction and Diels- Alder reaction. (7)
- (b) Explain the selective methods of preparation of alkenes through dehydration of alcohols and dehydrohalogenation of alkyl halides. Discuss the E1 and E2 mechanisms involved and justify the product formation using Saytzeff's rule. (7)

Section – C

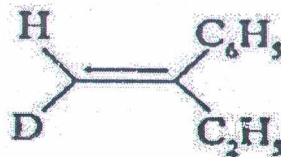
5. (a) Discuss SN1 mechanism of nucleophilic substitution reaction with detailed discussion on rearrangement, stereochemistry and solvent effect. (7)
- (b) Describe the mechanism of the Wittig reaction. Explain how ylide formation occurs and discuss the significance of the Wittig reaction in organic synthesis. (7)
6. (a) Explain the aldol condensation reaction with mechanism. Discuss the conditions required, variations of the reaction, and give suitable examples of both aldol addition and aldol condensation products. (7)
- (b) Write a note on Williamson ether synthesis and Auto oxidation (7)

Section – D

7. (a) Differentiate between enantiomers, diastereomers, and D-/L-isomers. Support your answer with suitable examples. (7)
- (b) Explain the E/Z system for naming alkenes and assign E/Z configurations to the following: (7)

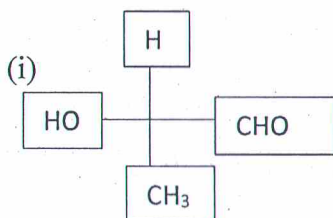


(i)

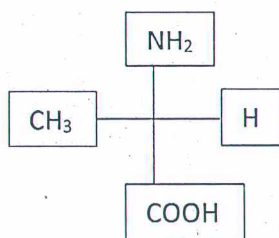


(ii)

8. (a) Draw potential energy diagrams for various conformations of n-butane and discuss their relative stabilities. (7)
- (b) Discuss the Cahn-Ingold-Prelog rules for assigning R and S configurations. Assign R and S configuration to the following Fischer Projection formulae. (7)



(ii)



Exam Code: 508601

Paper Code: 1206

Programme: Master of Science (Physics) (FYIP)

Semester-I

Course Title: Mathematical Physics-I

Corse Code: FPHL-1335

Time: 3 Hours

Max. Marks: 70

Note: Attempt five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 14 marks.

Section-A

Q1 (a) Solve the equation: $(1+y^2)x dx + (1+x^2)y dy = 0$. [7]

(b) Find the solution of $\frac{dy}{dx} = \frac{x-2y+5}{2x+y-1}$. [7]

Q2 (a) If $y_1 = e^{2x}$, $y_2 = e^{3x}$ and $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$, then by using Wronskian method check whether y_1, y_2 are linearly independent or not. [7]

(b) Solve the differential equation: $\frac{d^2y}{dx^2} + 2y = x \sin x$. [7]

Section-B

Q3 (a) If $\vec{a}, \vec{b}, \vec{c}$ are vectors, then check whether or not $2[\vec{a}, \vec{b}, \vec{c}] = [\vec{a} + \vec{b}, \vec{b} + \vec{c}, \vec{c} + \vec{a}]$. [7]

(b) Find h for which the points $(3, 2, 1)$, $(4, h, 5)$, $(4, 2, -2)$ and $(6, 5, -1)$ are coplanar. [7]

Q4 (a) Solve Cauchy Euler equation:

$$x^3 \frac{d^3 y}{dx^3} + 3x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = x^3 \log x. \quad [7]$$

(b) Solve by method of variation of parameters: $\frac{d^2 y}{dx^2} + y = \operatorname{cosec} x$. [7]

Section-C

Q5 (a) Find the directional derivative of the function $f = xy^2 + yz^3$ at the point $(2, -1, 1)$ in the direction of vector $(1, 2, 2)$. [7]

(b) Find the divergence and curl of $\vec{v} = (xyz) \hat{i} + (3x^2 y) \hat{j} + (xz^2 - y^2 z) \hat{k}$ at $(2, -1, 1)$. [7]

Q6 (a) Prove or disprove that $\operatorname{curl} \operatorname{grad} f = 0$ for any scalar f . [7]

(b) If $u = x^2 - y^2 + 4z$, find $\nabla^2 u$. [7]

Section-D

Q7 (a) Verify Gauss Divergence Theorem for the vector $\vec{F} = x\hat{i} + y\hat{j} + z\hat{k}$ over the region bounded by $x^2 + y^2 + z^2 = a^2$. [7]

(b) Express $2y\hat{i} - z\hat{j} + 3x\hat{k}$ in spherical polar coordinates. [7]

Q8 (a) Derive an expression for $\nabla\phi$ (i.e. $\operatorname{grad}\phi$) in orthogonal curvilinear co-ordinates. [7]

(b) Verify Green's theorem in plane for

$$\oint_C (-8y^2 + 3x^2)dx + (4y - 6xy)dy,$$

around the boundary C of the region enclosed by $x^2 = y$ and $\sqrt{x} = y$. [7]

Exam Code: 508601
(30)

Paper Code: 1204

Programme: Master of Science (Physics) (FYIP)
Semester-I

Course Title: Mechanics

Course Code: FPHL-1393 ✓

Time Allowed: 3 Hours

Max Marks: 70

Note:- Attempt five question in all, taking at least one question each from section A, B, C & D. All questions carry 14 equal marks.

Section A

1. Show that rotational invariance leads to the conservation of angular momentum. (14)
2. What is meant by Galilean transformations and Galilean invariance? Show that law of conservation of momentum is invariant under Galilean transformations. (14)

Section B

3. Find the general expression for kinetic energy of a rigid body rotating about Principal axes? (14)
4. Define moment of inertia, elementary gyroscope and its applications, precession. (14)

Section C

5. State Newton's law of gravitation. What is meant by gravitational constant? Distinguish between gravitational and inertial mass. (14)
6. What is reduced mass? Reduce the two body problem to one body problem and obtain the equation of motion for equivalent one body problem of two masses. (14)

Section D

7. Discuss the effect of Coriolis force in case of freely falling body on the surface of earth. (14)
8. Describe the construction of Foucault's pendulum. Show that rotation of plane of oscillation of the Foucault's pendulum is direct proof of the rotation of the earth about its own axis. (14)

Exam Code: 508601
(30)

Paper Code: 1205

Programme: Master of Science (Physics) (FYIP)
Semester-I

Course Title: Thermal Physics

Course Code: FPHL-1394

Time Allowed: 3 Hours

Max Marks: 70

Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Note: Students can use Non-Scientific calculators or logarithmic tables. All questions carries equal marks (14)

Section A

1. (a) Derive an expression for the efficiency of Carnot's heat engine, using one mole of an ideal gas as the working substance. (10)
(b) A Carnot's heat engine absorbs heat from source at 500K and rejects a part of heat to sink at 300 K. If the heat absorbed from the source be 1000 cal, then calculate the heat rejected to sink. (4)
2. (a) What is entropy? Prove that the entropy of a thermodynamical system remains constant in any reversible process. Also discuss the law of increase of entropy in natural process, giving suitable examples. (7)

- (b) Show that no irreversible heat engine can have efficiency greater than that of reversible heat engine working between same temperatures. (7)

Section B

3. (a) Show that in thermodynamics.

$$\frac{dp}{dT} = \frac{L}{T(V_2 - V_1)}$$

Discuss the effect of pressure on melting and boiling points of a substance. (7)

- (b) A wire is stretched adiabatically, show that the change in its temperature is given by

$dT = -\frac{n^{Tl}}{mC_p} dF$, where symbols have their usual meanings. Why does a rubber string heat up on stretching? Explain. (7)

4. What are thermodynamic potentials? Give their significance. Establish Four Maxwell's thermodynamic relations. (14)

Section C

5. Define first and second order phase transitions. Assuming the Gibb's function per unit mass remains constant in a first order phase change, obtain Clausius-Clapeyron's latent heat equation. Compare the change in g , s and v in the first and second order phase transitions. (14)

6. Give an account of Joule-Thomson experiment. Show that the change in temperature in a Joule-Thomson expansion is given by

$$dT = \frac{V}{C_p} (T\alpha - 1) dP.$$

Why does an ideal gas show neither a heating nor cooling effect in Joule-Thomson expansion. Analyse thermodynamically Joule Thomson effect for Vander Waal gasses. (14)

Section D

7. Using classical statistics to treat an ideal gas as a system, derive the Maxwell-Boltzmann distribution law for molecular speeds. Additionally, derive the expressions for the most probable speed, average speed, and root mean square speed. (14)
8. (a) What is the meaning of the term "degrees of freedom". Discuss how the specific heat of gasses and solids can be determined on the basis of the law of equipartition of energy. (7)
- (b) Explain the concept of Doppler Broadening of spectral lines. (7)

Exam Code: 508601

Paper Code: 1208

Programme: Master of Science (Physics) (FYIP) Semester-I

Course Title: Computer Fundamentals and PC Software

Course Code: FPHM-1126

Time Allowed: 3 Hours

Maximum Marks: 40

Note: Attempt five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 8 marks.

SECTION-A

1. Explain the different Generations of Computers, highlighting the key technological advancements that defined each generation. (8 Marks)
2. Draw and label the Block Diagram of a Computer system. Briefly explain the primary function of the Central Processing Unit (CPU), Memory, and Input / Output Devices, and describe their interrelation in processing data. (8 Marks)

SECTION-B

3. (a) Differentiate between System software and Application software, providing examples of each. (4 Marks)
(b) Explain the concept of Programming languages and their role in a computer system. (4 Marks)
4. Discuss the characteristics and working principles of the following input/output devices: (2+2+2+2 Marks)
(a) Optical Mark Reader (b) Optical Character Recognition
(c) Plotters (d) Voice Output Systems

SECTION-C

5. Define an Operating System and explain its primary purpose in managing system resources. Differentiate between the interaction methods of a Windows GUI (Graphical User Interface) and a Command-line interface. (8 Marks)
6. (a) Explain the procedure and utility of using Macros and mail merge in a Word Processor. (4 Marks)
(b) Describe the steps for inserting page numbers, bookmarks, and setting up a document for printing. (4 Marks)

SECTION-D

7. (a) Explain the process of inserting audio and video into a Presentation. (4 Marks)
(b) Describe the steps for formatting a presentation and playing slides. (4 Marks)
8. (a) Explain the concepts of sorting and filtering data in a Spreadsheet. (4 Marks)
(b) Describe the steps and utility of using Charts and Graphs to represent data in a spreadsheet. (4 Marks)