CLASS XII HOLIDAY HOMEWORK 2018-19

S.NO	SUBJECT
1.	English Core (301)
2.	Physics (042)
3.	Biology (044)
4.	Chemistry (043)
5.	Accountancy(055)
6.	B. Studies (054)
7.	Economics (030)
8.	Political Science (028)
9.	PAINTING (049)
10.	Phy. Education (048)
11.	HISTORY (027)
12.	Multi Media & Web Technology
13.	**Mathematics (041)**

The holiday homework should be completed in your respective subject register.

Projects should be made according to the instructions given.

ENGLISH HOLIDAY HOMEWORK
CLASS XII

Novel - The Invisible Man

READ CHAPTERS 15-28 AND ATTEMPT THESE QUESTIONS IN ENGLISH NOTEBOOK

Questions based on plot, theme and character

Q1. Give an account of the strange man's arrival at the 'Coach and Horses.
Q2. Give a brief description of the strange man's appearance.
Q3. What did Mrs. Hall assume about the stranger regarding his strange appearance?
Q4. How did the Invisible Man make Marvel feel that he was real?
Q5. How did the Invisible Man threaten Mr. Marvel?
Q6. "I wish I was dead". Who spoke these words and why?
Q7. What according to Griffin was his greatest mistake?
Q8. How did the Invisible Man meet his end?
Q9. Describe dying Invisible Man's appearance.
Q10. How does "the epilogue" bring out the real character of Marvel?
Q11. Discuss the plot structure of the novel 'The Invisible Man' by H.G. Wells.
Q12. Describe Mrs. Hall as a wise and well-organised woman.
Q13. Why did the people of Iping turn hostile towards the stranger?
Q14. Describe the meeting between Marvel and the Invisible Man.
Q15. Describe Mr. Cuss's Meeting with the Stranger.
Q16. Where did Griffin take shelter after giving a slip to the people of Jolly Cricketers?
Q17. What did Griffin tell Dr. Kemp about himself?
Q18. Describe Griffin's struggle as an invisible man.
Q19. What were Griffin's plans before and after he met Dr. Kemp?

PHYSICS
HOLIDAY HOMEWORK
GRADE-XII

- **COMPLETE THE INVESTIGATORY PROJECT AND MAKE A REPORT ON IT.**
- **STUDENTS MUST SUBMIT INVESTIGATORY PROJECT/PROJECT REPORT&LAB MANUALS BY 10/07/02018**

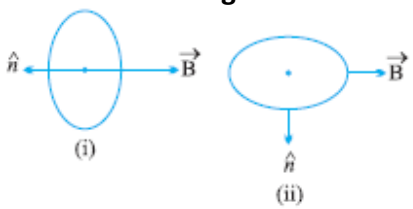
- **DO THE FOLLOWING QUESTIONS IN PHYSICS NOTEBOOK**

Questions carry 2 marks

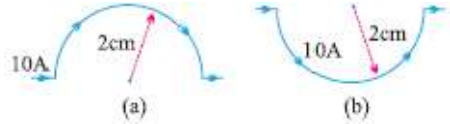
1. Write the four measures that can be taken to increase the sensitivity of galvanometer.

2. A galvanometer of resistance 120Ω gives full scale deflection for a current of 5mA. How can it be converted into an ammeter of range 0 to 5A? Also determine the net resistance of the ammeter.

3. A current loop is placed in a uniform magnetic field in the following orientations (1) and (2). Calculate the magnetic moment in each case.



4. A current of 10A flows through a semicircular wire of radius 2 cm as shown in figure (a). What is direction and magnitude of the magnetic field at the centre of semicircle? Would your answer change if the wire were bent as shown in figure (b) ?



5. A proton and an alpha particle of the same enter, in turn, a region of uniform magnetic field acting perpendicular to their direction of motion. Deduce the ratio of the radii of the circular paths described by the proton and alpha particle.

6. Why does the susceptibility of dimagnetic substance independent of temperature ?

Questions carry 5 marks

1. How will a diamagnetic, paramagnetic and a ferromagnetic material behave when kept in a non-uniform external magnetic field? Give two examples of each of these materials. Name two main characteristics of a ferromagnetic material which help us to decide suitability for making.
(i) Permanent magnet (ii) Electromagnet.

2. State Biot-Savart law. Use it to obtain the magnetic field at an axial point, distance *d* from the centre of a circular coil of radius '*a*' and carrying current I. Also compare the magnitude of the magnetic field of this coil at its centre and at an axial point for which the value of *d* is $3^{½}$ a .

3. Write an expression for the force experienced by a charged particle moving in a uniform magnetic field B. With the help of diagram, explain the principle and working of a cyclotron. Show that cyclotron frequency does not depend on the speed of the particle.

4. Write the principle, working of a moving coil galvanometer with the help of neat labelled diagram. What is the importance of radial field and phosphor bronze used in the construction of moving coil galvanometer?
5. Draw a labelled diagram to explain the principle and working of an a.c. generator. Deduce the expression for emf generated. Why cannot the current produced by an a.c. generator be measured with a moving coil ammeter?

NUMERICALS

1. An electron travels on a circular path of radius 10 m in a magnetic field of 2×10^{-3} T. Calculate the speed of electron. What is the potential difference through which it must be accelerated to acquire this speed? [Ans. Speed = 3.56 × 109 m/s; V = 3.56 × 107 volts]

2. A charge particle of mass *m* and charge *q* entered into magnetic field B normally after accelerating by potential difference V. Calculate radius of its circular path.

[Ans. $r = \frac{1}{B}\sqrt{\frac{2mv}{q}}$**]**

3. Calculate the magnetic field due to a circular coil of 500 turns and of mean diameter 0.1m, carrying a current of 14A (i) at a point on the axis distance 0.12 m from the centre of the coil (ii) at the centre of the coil. [Ans. (i) 5.0×10^{-3} Tesla; (ii) 8.8×10^{-2} Tesla]

4. An electron of kinetic energy 10 keV moves perpendicular to the direction of a uniform magnetic field of 0.8 milli tesla. Calculate the time period of rotation of the electron in the magnetic field. [Ans. 4.467×10^{-8} s.]

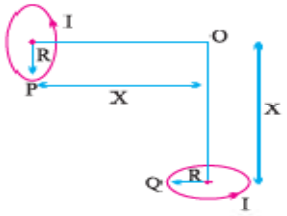
5. If the current sensitivity of a moving coil galvanometer is increased by 20% and its resistance also increased by 50% then how will the voltage sensitivity of the galvanometer be affected?

6. A uniform wire is bent into one turn circular loop and same wire is again bent in two circular loop. For the same current passed in both the cases compare the magnetic field induction at their centres. [Ans. Increased 4 times]

7. A horizontal electrical power line carries a current of 90A from east to west direction. What is the magnitude and direction of magnetic field produced by the power line at a point 1.5 m below it? [Ans. 1.2 × 10–5 T South ward]

8. A galvanometer with a coil of resistance shows full scale deflection for a potential difference 25mV. What should be the value of resistance to convert the galvanometer into a voltmeter of range 0V to 5V. How should it be converted? [Ans. 1910 Ω in series]

9. Two identical circular loops P and Q carrying equal currents are placed such that their geometrical axis are perpendicular to each other as shown in figure. And the direction of current appear's anticlockwise as seen from point O which is equidistant from loop P and Q. Find the magnitude and direction of the net magnetic field produced at the point O.



$\tan\theta = \frac{B_2}{B_1} = 1,\ \theta = \pi/4.$ **[Ans.** $\frac{\mu_0 I R^2 \sqrt{2}}{2(R^2+x^2)^{3/2}}$ **]**

10. A cyclotron's oscillator frequency is 10 MHz. What should be the operating magnetic field for accelerating protons, if the radius of its dees is 60 cm ? What is the kinetic energy of the proton beam produced by the accelerator? Given *e* = 1.6 × 10^{-19} C, *m* = 1.67 × 10^{-27} kg. Express your answer in units of MeV [1MeV = 1.6 × 10^{-13} J]. [Ans. B = 0.656T, Emax = 7.421 MeV]

11. The coil of a galvanometer is 0.02 × 0.08 m^2. It consists of 200 turns of fine wire and is in a magnetic field of 0.2 tesla. The restoring torque constant of the suspension fibre is 10^{-6} Nm per degree. Assuming the magnetic field to be radial. (i) What is the maximum current that can be measured by the galvanometer, if the scale can accommodate 30° deflection?
(ii) What is the smallest, current that can be detected if the minimum observable deflection is 0.1°? [Ans. (i) 4.69 × 10^{-4} A; (ii) 1.56 × 10^{-6} A]

12. A voltmeter reads 5V at full scale deflection and is graded according to its resistance per volt at full scale deflection as 5000ΩV^{-1}. How will you convert it into a voltmeter that reads 20V at full scale deflection? Will it still be graded as 5000 ΩV–1? Will you prefer this voltmeter to one that is graded as 2000 ΩV^{-1}? [Ans. 7.5 × 10^4 Ω]

13. A short bar magnet placed with its axis at 30° with an external field 1000G experiences a torque of 0.02 Nm. (i) What is the magnetic moment of the magnet. (ii) What is the work done in turning it from its most stable equilibrium to most unstable equilibrium position? [Ans. (i) 0.4 Am2; (ii) 0.08 J]

14. What is the magnitude of the equatorial and axial fields due to a bar magnet of length 4 cm at a distance of 40 cm from its mid point? The magnetic moment of the bar magnet is a 0.5Am^2. [Ans. BE = 7.8125 × 10^{-7} T; BA = 15.625 × 10^{-7} T]

15. What is the magnitude of magnetic force per unit length on a wire carrying a current of 8A and making an angle of 30° with the direction of a uniform magnetic field of 0.15T?

16. Two moving coil galvanometers, M1 and M2 have the following specifications.
R1 = 10Ω, N1 = 30, A1 = 3.6 × 10–3m^2, B1 = 0.25T
R2 = 14Ω, N2 = 42, A2 = 1.8 × 10–3m^2, B2 = 0.50T
Given that the spring constants are the same for the two galvanometers, determine the ratio of (a) current sensitivity (b) voltage sensitivity of M1 & M 2. [Ans. (a) 5/7 (b) 1:1]

17. A straight wire of mass 200 g and length 1.5 m carries a current of 2A. It is suspended in mid-air by a uniform horizontal magnetic field B. What is the magnitude of the magnetic field?

18. A rectangular loop of sides 25 cm and 10 cm carrying current of 15A is placed with its longer side parallel to a long straight conductor 2.0 cm apart carrying a current of 25A. What is the new force on the loop ? [Ans. 7.82 × 10^{-4} N towards the conductor]

CLASS XII BIOLOGY HOLIDAY HOME WORK SESSION 2018-19

- **Students will prepare a project report/ case study/ model on the topic assigned in class.**
- **Students will also complete following assignment in their note books**.

1. Name the three non-sense codons? [1]
2. What is the base pairing pattern of DNA? [1]
3. Mention the dual functions of AUG? [1]
4. What is point mutation?[1]
5. What is aneuploidy?[1]
6. Why is DNA & not RNA is the genetic material in majority of organisms? [2]
7. Mention any four important characteristics of genetic code. [2]
8. Why it is that transcription & translation could be coupled in prokaryotic cell but not in eukaryotic cell?[2]
9. Draw and explain test cross with an example?[2]
10. Differentiate between multiple allelism and pleiotropy with the help of an example each?[2]
11. What are the three types of RNA & Mention their role in protein Synthesis? [3]
12. What is transforming principle? Who proved it experimentally & how? [3]
13. Write a note on Mendelian traits?
14. Is haemophilia in humans a sex linked or autosomal disorder? Work out a cross in support of your answer?[3]
15. A colourbind child is born to a normal couple. Workout a cross to show how it is possible. Mention the sex of this child?[3]
16. Why is the possibility of a female suffering from haemophilia rare? Explain.[3]
17. Explain why it is scientifically incorrect to blame the mother for bearing female child?[3]
18. A cross between a normal couple resulted in a son who was haemophilic and a normal daughter. In course of time, when the daughter was married to a normal man, to their surprise, the grandson was also haemophilic. (i) Represent this cross. Give the genotype of the daughter and her husband. (ii) Write the conclusion you draw for the inheritance pattern of this disease.[3]
19. During a medical investigation, an infant was found to possess an extra chromosome 21. Describe the symptoms the child is likely to develop later in the life?[3]
20. Which chromosome carry the mutant genes causing thalassemia in humans? What are the problems caused by these mutant genes?[3]
21. Explain the structure of human DNA?[3]
22. State the role of VNTR in DNA fingerprinting?[3]
23. Explain post-transcriptional changes?[3]
24. Explain the working of lac-operon?[3]
25. Write any three goals of human genome project?[3]
26. What is genetic code? Explain degenerate code, unambiguous code, universal code, initiator code?[3]
27. Explain the process of DNA fingerprinting?[3]
28. Explain the semi-conservative nature of DNA?[3]
29. Which one is better genetic material DNA or RNA? Explain?[3]
30. Draw a replication fork? Label leading and lagging strand, okazaki fragments, RNA primer?[3]

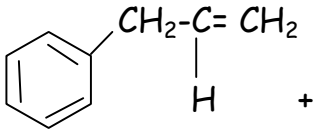
CHEMISTRY
CLASS XII
HOLIDAY HOMEWORK

WORKSHEET

PROJECT IS MENTIONED AT END

1. Write the products of the following reactions:

   (i) $CH_3\text{-}CH_2\text{-}CH{=}CH_2 + HCl \longrightarrow$

   (ii) 

2. Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.
3. Although chlorine is an electron-withdrawing group, yet it is ortho-, para-directing in electrophilic aromatic substitution reactions. Why?
4. Why is sulphuric acid not used during the reaction of alcohols with KI?
5. Predict all the alkenes that would be formed by dehydrohalogenation of the following halides with sodium ethoxide in ethanol and identify the major alkene, (i) 1-Bromo-1-methylcyclohexane (ii) 2-chloro-2-methylbutane (iii) 3-Bromo-2,2,3-trimethylpentane.
6. Convert the following:
   a) Bromomethane to propanone
   b) But-1-ene to but-2-ene.
7. Explain why:
   a) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
   b) Alkyl halides, though polar, are immiscible with water?
   c) Grignard reagents should be prepared under anhydrous conditions?
8. Explain the following reaction:

   $n\text{-BuBr} + KCN \xrightarrow{EtOH\text{-}H_2O} n\text{-BuCN}$

(i) 2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane.1-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 2-Bromo-3-methylbutane.

(ii) 1-Bromobutane, 1-Bromo-2, 2-dimethylpropane, 1-Bromo-2-methylbutane, 1-Bromo-3-methylbutane.

10. *p*-Dichlorobenzene has higher melting point and lower solubility than those of o- and m-isomers. Discuss.
11. How the following conversions can be carried out:
    a) Aniline to chlorobenzene
    b) But-1-ene to n-butyl iodide
    c) Isopropyl alcohol to iodoform
    d) Aniline to phenyl isocyanide
    e) Benzene to 4-bromonitrobenzene
    f) Ethyl chloride to propanoic acid
    g) Chlorobenzene to p-nitrophenol
    h) *tert*-Butyl bromide to isobutyl bromide.
12. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in presence of alcoholic KOH, alkenes are the major products. Explain why?
13. Primary alkyl halide C_4H_9Br (a) reacted with alcoholic KOH to give compound (b). Compound (b) is reacted with HBr to give (c) which is an isomer of (a). When (a) is reacted with Na metal, it gives a compound (d), C_8H_{18} which is different from the compound formed when *n*-butyl bromide is reacted with sodium. Give the structural formula of (a) and write the equation for all the reaction

(PROJECT)

NAME OF STUDENT	PROJECT ALLOTED
ABHAY SHRAMA	GREEN CHEMISTRY
ANKIT THAPAR	DRUGS AND MEDICINES
ARYAN KALRA	FOOD ADULTERATAION
DIVYANSH RANA	ALLOTROPHES OF CARBON
DIVYANSHU BANSAL	PRIMARY AND SECONDARY CELL
EKAMJOT SINGH GHUMAN	POLYMERS
GAGANDEEP SINGH	NATURAL POLYMER
GURINDER SINGH	CORROSION OF METALS
GURYUVRAJ SINGH	SYNTHETIC POLYMER
HIMANI SACHDEVA	DEFECTS IN SOLIDS
ISHITA GUPTA	COLLIGATIVE PROPERTIES
KABIR SINGH	CHROMATOGRAPHY
MANAVJOT SINGH	CLEANSING AGENT OF SOAP
MANVEET KAUR	CHEMISTRY IN EVERYDAY LIFE
MIHIR	COORDINATION COMPOUNDS
SAHILDEEP SINGH	IMPORTANCE OF PH
SUKHTEJ SINGH	CHEMICALS IN FOOD
SURAJ KUMAR	NATURAL PROCESSES
LOVEPREET KAUR	PROTIENS
AARZOO	CARBOHYDRATES
MAGNI	VITAMINS
PARAMPREET	DRUGS AND MEDICINE
NATASHA RAI	ENZYMES

NOTE:

- ✓ Students must submit their project work and practical file on 9th July, 2018 positively.
- ✓ Project files and practical files must be in accordance with the instructions given in class.

ACCOUNTS
GRADE-XII
TOPIC: COMPREHENSIVE PROBLEM

PROJECT WORK

DATE OF SUBMISSION: 10th July,2018

*Name of student, School, Class, Roll no.
*Acknowledgement
*Index
***Comprehensive Problem**

- Statement
- Journal
- Ledger
- Trial Balance
- Closing Entries
- Financial Statements(Trading and Profit and Loss Account, Profit and loss Appropriation Account and Balance Sheet)

REVISION WORK

ACCOUNTANCY
TOPIC: ACCOUNTING FOR PARTNERSHIP FIRMS

- ADMISSION OF PARTNER
- RETIREMENT/DEATH OF PARTNER

NOTE: Do questions of above mentioned topics from back exercises and prepare for the test.

Business Studies

Holiday H.W XII (commerce)

(Submission date- 9th July 2018)

1. **Complete assignment of Ch-Staffing in the notebook.**
2. **Type your RESUME/ BIO DATA and paste it in your notebook.**
3. **Revise chapters 1,2,3,4,5 and 6.**

Assignment

Q.1. Which function of management helps in obtaining right people and putting them on the right jobs? Explain importance of this function (any 4 points).

Q.2. It implies introducing the selected employees to other employees and familiarizing him with the rules and policies of the organization. Name and explain the training method it.

Q.3. "Internal sources of recruitment are better than external sources of recruitment". Do you agree with this statement? Give any two reasons in support of your answer.

Q.4. Himesh is working as a supervisor in a company. Due to his hard work he is promoted to the post of Production Manager. Now the post of supervisor is vacant and no one can be transferred or promoted to this post. Name the source of recruitment the company will use to fill up this post. State any three advantages of using this source of recruitment.

Or

Which source of requirement is needed to bring new blood in the organization? Explain any three advantages of this source.

Q.5. It is the process of identifying and choosing the best person out of a number of prospective candidates for a job. Name and explain the steps in this process.

Q.6. Which step in the process of selection helps the manager to eliminate unqualified or unfit job seekers based on the information supplied in the application forms.

Q.7. It is the process of increasing the knowledge and skills of an employee for doing a particular job. Identify the concept and mention different methods used in this concept.

or

What helps the employees in improving their job knowledge and efficiency?

Q.8. Which type of training is a joint programme of training in which educational institution and business firms cooperate? Explain it.

Q.9. Trainee is put under the guidance of a master worker to require a higher level of skill. For example to become plumber, electrician etc. Which method of training is referred here?

Q.10. In which type of training, employees learn their jobs on the equipments they will be using, but the training is conducted away from the actual work floor. Explain two other methods relating to this.

Q.11. “There is no need of human resource planning as so many people are available in the market these days” do you agree with this statement? Give reasons.

Q. 12. “A newly appointed personnel manager is of the view that there is no need for training the workers”. Do you agree with his views? Give reasons in support of your answer.

ECONOMICS (COMMERCE & Humanities)
HOLIDAY HOMEWORK
CLASS-12
SUBMISSION OF PROJECT- 9TH JULY 2018

Prepare the project on the basis of the guide lines given below

Guidelines for Project Work in Economics (Class XII)

Students are supposed to pick any **ONE** of the two suggested projects.

I. Project (Option One) : What's Going Around Us

The purpose of this project is to –

- Enable the student to understand the scope and repercussions of various Economic events and happenings taking place around the country and the world. (eg. The Dynamics of the Goods & Services Tax and likely impacts on the Indian Economy or the Economics behind the Demonetization of 500 and 1000 Rupee Notes and the Short Run and Long Run impact on the Indian Economy or The impact of BREXIT from the European Union etc.)
- Provide an opportunity to the learner to develop economic reasoning and acquire analytical skills to observe and understand the economic events.
- Make students aware about the different economic developments taking place in the country and across the world.
- Develop the understanding that there can be more than one view on any economic issue and to develop the skill to argue logically with reasoning.
- Compare the efficacy of economic policies and their respective implementations in real world situations and analyse the impact of Economic Policies on the lives of common people.
- Provide an opportunity to the learner to explore various economic issues both from his/her day to day life and also issues which are of broader perspective.

Scope of the project: Student may work upon the following lines:

- Introduction
- Details of the topic
- Pros and Cons of the economic event/happening
- Major criticism related to the topic (if any)
- Students' own views/perception/ opinion and learning from the work
- Any other valid idea as per the perceived notion of the student who is actually working and presenting the Project-Work.

Mode of presentation and submission of the Project: At the end of the stipulated term, each student will present the work in the Project File (with viva voce) to the external examiner.

Marking Scheme: Marks are suggested to be given as –

S. No.	**Heading**	**Marks Allotted**
1.	Relevance of the topic	3
2.	Knowledge Content/Research Work	6
3.	Presentation Technique	3
4.	Viva	8
	Total	**20 Marks**

The external examiner should value the efforts of the students on the criteria suggested.

Suggestive List

1. Micro and small scale industries
2. Food supply channel in India
3. Contemporary employment situation in India
4. Disinvestment policy
5. Health expenditure (of any state)
6. Goods and Services Tax Act
7. Inclusive growth strategy
8. Human Development Index
9. Self-help groups
10. Any other topic

II. Project (Option Two): Analyze any concept from the syllabus

The purpose of this project is to –

- Develop interest of the students in the concepts of Economic theory and application of the concept to the real life situations.
- Provide opportunity to the learners to develop economic reasoning *vis-a-vis* to the given concept from the syllabus.
- Enable the students to understand abstract ideas, exercise the power of thinking and to develop his/her own perception
- To develop the understanding that there can be more than one view on any economic issue and to develop the skill to argue logically with reasoning
- Compare the efficacy of economic policies in real world situations
- To expose the student to the rigor of the discipline of economics in a systematic way
- Impact of Economic Theory/ Principles and concepts on the lives of common people

Scope of the project:

Following essentials are required to be fulfilled in the project.

Explanation of the concept:

- Meaning and Definition
- Application of the concept
- Diagrammatic Explanation (if any)
- Numerical Explanation related to the concept etc. (if any)
- Students' own views/perception/ opinion and learning from the topic..

Mode of presentation and submission of the Project:

At the end of the stipulated term, each student(s) will present their work in the Project File (with viva voce) to the external examiner.

Marking Scheme:

Marks are suggested to be given as –

S. No.	Heading	Marks Allotted
1.	Relevance of the topic	3
2.	Knowledge Content/Research Work	6
3.	Presentation Technique	3
4.	Viva	8
	Total	**20 Marks**

The external examiner should value the efforts of the students on the criteria suggested.

Suggested List

- Price Determination Price Discrimination
- Opportunity Cost Production Possibility Curve
- Demand and its determinants Supply and its determinants
- Production – Returns to a Factor Cost function and Cost Curves
- Monopoly Oligopoly
- Monopolistic Competition Credit Creation
- Money Multiplier Central Bank and its functions
- Government Budget & its Components Budget deficit
- Exchange Rate Systems Foreign Exchange Markets
- Balance of payments Any other topic

POLITICAL SCIENCE
CLASS XII
HOLIDAY HOMEWORK WORKSHEET

NOTE: DO ALL THE GIVEN QUESTIONS IN YOUR NOTEBOOK ONLY.

1. What were the three challenges that India faced just after independence? (6)
2. When was state reorganization commission set up? What were their major recommendations? (6)
3. What were the major reasons for congress dominance in first three general elections? (6)
4. Write a note on Bhartiya Jana sangha and its ideology. (4)
5. What was the Green revolution? Mention its positive and negative impact.(6)
6. What were the major key controversies during the initial years of planning in India? (6)
7. What was NAM? What was India's stand for the policy of Non Alignment?(6)
8. Write a detailed note on Indo China relationship. (6)
9. Write a detailed note on Indo Pakistan relationship from independence till to date.
10. Write a note on nuclear policy of India. (6)
11. The year 1967 is considered a landmark year in India's politics. Justify the statement with reference to 1967 General election. (6)
12. How Indira Gandhi did restored the position of congress through the general election of 1971?(6)
13. Write a note on emergency and its consequences. (6)
14. Write a note on activities taken by dalits under dalit panther's movement.(6)
15. What lessons we can learn from popular struggles and movements? (4)
16. Write a note on Punjab Accord and its terms.
17. Jammu and Kashmir is one of the living examples of plural society and politics. Justify the statement.
18. What lessons we can learn from the regional aspirations in a democratic country like India?
19. What were the five major developments in the context of Indian politics in 1990,s that put deep impact on politics?
20. Write a note on Mandal commission.

PAINTING (OPTIONAL & ADDITIONAL)
HOLIDAY HOMEWORK
CLASS -12TH

- Prepare your portfolio (art file). It must have more than 20 paintings (10 still life paintings, 10 landscapes & other work)

- Prepare one A3 size canvas. (Any theme)

- Revise your four units from panoramic Indian painting book.

PHYSICAL EDUCATION (OPTIONAL & ADDITIONAL)
HOLIDAY HOMEWORK
XII

- COMPLETE YOUR PHYSICAL EDUCATION RECORD FILE DURING HOLIDAYS.

*Record File shall include:

Practical-1: Modified AAHPER administration for all items.

Practical-2: Conduct Barrow 3 Item Test on 10 students.

Practical-3: Procedure for Asanas, Benefits & Contraindication for any two Asanas each lifestyle disease.

Practical-4: Procedure for administering Senior Citizen Fitness Test for 5 elderly family members.

*Athletics, Basketball, Football, Handball, Hockey, Kho Kho, Rifle Shooting, Unified Basketball & Volleyball

Practical-5: Any one game of your choice out of the list above. Labelled diagram of field & equipment Rules, Terminologies & Skills).

NOTE :- ATHLETICS IS COMPULSORY

HISTORY HOLIDAY HW NOTE: PLEASE DO AS PER GUIDELINES GIVEN IN CLASS

PROJECT WORK

Book 1

THEMES IN INDIAN HISTORY-PART I

TOPIC: Town planning and Artifacts of the Harappan civilization.

Objectives: The purpose of this study is as follows:

- It will help students to understand the importance of artifacts as a source for studying ancient civilizations.
- Students will appreciate the town planning of Harappan Civilization and can compare it with the modern towns and cities.
- It will create awareness on the kind of life people led then.

Methodology:

(1) This project could be introduced to the students, by the teacher in the following ways-

- Visiting the Harappan section of the National Museum in Delhi (If one lives in Delhi or close to it)
- Reading a story called 'Foot loose in the City' from the collection of stories called 'The Forbidden Temple' (Refer to sources) and list out the features and characteristics of the protagonist's lifestyle and city
- Having a general discussion about the Harappan civilization (This should be done only after the first chapter has already been taught in class).
- They can surf the net and can get the details about the Harappan civilization.

(2) After introducing the topic an activity to be organized, in order to help the students to know how artifacts are used to gauge information about a civilization. Each person should bring an object to class. This could be an object of daily use or even something like a vase, sculpture, artificial jewelry, accessory etc. The objects should be put together and the class may be divided into groups of four or five. Each group to discuss about at least five objects on the basis of questions- [sample questions given below.

- What is the material out of which the object is made?
- What are the different ways in which these objects could be used?

- How did one find out about the uses of the object? (Was it by comparing it with other objects, or by asking people etc?)
- What does the object tell about the lifestyle of the person who uses it?

One member from each group may tell the class about the inferences drawn and a general class discussion could follow. This activity would help the students to realize how archeologists and historians look at objects in different ways to extract information from them.

(3) After this, the study becomes more focused as information about different artifacts is collected. One way to do this would be to divide students into groups of four or five and asking each group to choose one of the following artifacts given in the text book,

- Beads and jewelry
- Sculptures and figurines
- Tools and equipments
- Seals and weights
- Pottery and utensils

The information could be collected from the section on 'Sources' of the text book, visit to a museum or visit the site if living close by. It can be analyzed keeping the following points in mind-

- The description of the artifact
- Where the materials have come from?
- What might have they been used for ?
- How could experts have found out information about its utility?
- What specific details does it give about the Harappan culture?

Presentation

(1) In the form of an exhibition, the students could create 'An ancient Harappan market'. Stalls could be set up in the site of the exhibition and the artifacts that the students have collected\studied could be displayed as things that are sold in the market. The market could include a workshop for the production of seals too. The students could also dress up like the Harappans and pretend to be shopkeepers, merchants, traders, artisans, musicians, peasants (who have come to sell their grains) and town dwellers. A barter system could be shown. This exhibition could also be put up around the model of the miniature city made by the students using cardboards, wooden planks, sand etc.

(2) The students can make presentation in the form of a report, based on the research work done.

Assessment

The total marks allotted for the project will be 20 marks. The following are the methods and criteria for evaluation:

- **Research contribution**:

  These marks are to be entered by the teacher when the activities and the research are being conducted. Each student will get marks individually according to his/her involvement.

Involvement in activity	2 marks
Understanding of concepts discussed	3 marks
Research contribution (Total)	5 marks

- **Report Writing:**

Content and Presentation	2 marks
Analysis, interpretation and inferences drawn	4 marks
Written Report Assessment (total))	6 marks

- **Thus evaluation would include :**

Research contribution (Total)	5 marks
Written Report Assessment (Total)	6 marks
Individual presentation /explanation (Total)	5 marks
Viva	4 marks
Total	**20 marks**

Sources:

Books:

1. *Raymond and Bridget Allchin.1997. Origins of Civilization. Viking, New Delhi*
2. *G.LPossehl. 2003. The Indus Civilization.Vistaar, New Delhi.*
3. *ShereenRatnagar. 2001. Understanding Harappa.Tulika, New Delhi.*
4. *T.V Padma. 2004. The Forbidden Temple.Tulika, New Delhi.*
5. *A.L Basham. 2004. The Wonder that was India, Third Revised Edition.Picador India, London.*
6. *Upinder Singh. 2002. Mysteries of the Past-Archaeological Sites in India. National Book Trust,India, New Delhi*

Internet:

1. *www.harappa.com/har/harreso.html*
2. *www.ancientcivilizations.co.uk/home_set.html*
3. *http://en.wikipedia.org/wiki/Indus_Valley_Civilization*
4. *www.thenagain.info/webchron/india/harappa.html*

Multimedia and Web Technology Summer Assignment 2018-19
Grade: 12

- Create a **Report file** containing**20 programs**, covering the following topics:

  - A simple web page containing almost all the tags of HTML and view that web page on the browser.
  - Use of Operators
  - Built In Functions
    - String Manipulation Functions
    - Time & Date Functions
  - Arrays
  - Conditional statements: if, if else, if...elseif....else, switch
  - Loops: while, do while , for, for each
  - Unconditional exit from loop /switch using break
  - User Defined Functions:
    - Defining a function, calling/invoking a function
    - Passing parameters/arguments
  - Global Variables – Superglobals

    (TO BE DONE LATER)
  - PHP Forms
    - Form Handling
    - Form Validation
    - Form URL/E-mail
  - Text Files
    - Opening a file
    - Reading a file
    - Writing a file
    - Closing a file
  - Working on Database(Using MySQLi Procedural API)
    - Connecting with Databases
    - Opening and closing databases
    - Inserting, retrieving, modifying/updation , deleting of records from tables
  - Using MySQL creating Database and table, defining primary key, inserting records, displaying records using SELECT command, WHERE clause, modifying records using UPDATE, deleting records.

  - Multimedia and Authoring Tools
    - Embedding: Audio/Video on the web page

- Multimedia Authoring Using Macromedia Flash: Making of simple movie, setting properties, frame rate, dimensions, and background color
- Movie Frames
- Scene: Concept of scene, duplicate scene, add scene, delete scene, and navigating between scenes
- Layers: Concept of layer, layer properties, layer name, show/hide/lock layers, viewing layer as outline, adding/deleting a layer
- Types of Layer - normal/guide/mask
- Special Effects: Motion Tweening, Shape Tweening, Inserting Sound Layer
- Testing a Scene and Movie

- **Project** based on case study

Case Studies are to be divided into following parts:

1. Case study Part 1 (collection, editing and creation of website resources):
   - Create an electronic movie with various pictures, audio clipping, movie clippings, and factual text related to school / organization
   - Embedding video and audio in web pages.
   - An introduction to interactive walk-through.
   - Embedding walk-through into web pages.
2. Case Study Part 2 (development of web content with resources):

Case studies covered in class XI with **database support**

- With Login
- Online Registration
- Booking and/or ordering facility.

The web site should be able to reflect a company in terms of:

- Home Page
- Enhance the home page by providing links to other sample pages
- Embed Time and Date on the home page
- Product & Promotion Page
- Further enhance the website by providing User Registration Page. Collect the user details and Display a new web page showing “Thanks For Registration”. Also write appropriate functions to validate form inputs.
- Give a login facility to the user with anonymous name and maintain the session till the user logs out.
- For user log in attempts, maintain a visitor count.

- Change the login module of the web page and now connect it to the Company's User database on the server. This is to be done to store the registration detail and facilitate login to the user.
- The login page is to be made in a way that it should also provide facility to **change password**, if user forget password.
- Store some of the created or edited sound files on the web-server and provide links to play it.
- Change the appearance of the web page using pictures at appropriate places (e.g. logo of the company, photograph building etc.)
- Distributor Login Page / Password Recovery Page
- Distributor Specific Details Page
- Registration Page for Distributor-ship
- Company News and Flashes
- Company Profile

Technical Details:

- Web site Introduction is to be made in movie making software.
- A proper database is to be maintained for the distributor information.
- Note:
- For developing the above sites/movies collect the actual information from various sources.
- You can use alternative case studies also of similar kind.

Please note the following points:

- Use a spiral file (So you can add or remove pages later on)
- Write the code on right side (Hand written or print)
- Print or draw the output on the left page
- Create
    - a front page
    - Index page, with page numbers
    - Acknowledgement
    - Introduction to software used
    - Bibliography
- Cover your file neatly

CLASS-12 **HOLIDAYS HOMEWORK** **SUBJECT-MATHS**

CHAPTER: CONTINUITY AND DERIVATIVES

1. For what value of x, $f(x) = |2x - 7|$ is not derivable.
2. Write the set of points of continuity of $g(x) = |x - 1| + |x + 1|$.
3. What is derivative of $|x - 3|$ at $x = -1$.
4. What are the points of discontinuity of $f(x) = \dfrac{(x-1)+(x+1)}{(x-7)(x-6)}$.
5. Write the number of points of discontinuity of $f(x) = [x]$ in $[3, 7]$.
6. The function, $f(x) = \begin{cases} \lambda x - 3 & \text{if } x < 2 \\ 4 & \text{if } x = 2 \\ 2x & \text{if } x > 2 \end{cases}$ is a continuous function for all $x \in R$, find λ.
7. For what value of K, $f(x) = \begin{cases} \dfrac{\tan 3x}{\sin 2x}, & x \neq 0 \\ 2K, & x = 0 \end{cases}$ is continuous $\forall\, x \in R$.
8. Write derivative of $\sin x$ *w.r.t.* $\cos x$.
9. If $f(x) = x^2 g(x)$ and $g(1) = 6$, $g'(1) = 3$ find value of $f'(1)$.
10. Write the derivative of the following functions :

    (i) $\log_3 (3x + 5)$ (ii) $e^{\log_2 x}$

    (iii) $e^{6\log_e (x-1)}$, $x > 1$

    (iv) $\sec^{-1}\sqrt{x} + \operatorname{cosec}^{-1}\sqrt{x}$, $x \geq 1$.

    (v) $\sin^{-1}\left(x^{7/2}\right)$ (vi) $\log_x 5$, $x > 0$.

11. Discuss the continuity of following functions at the indicated points.

(i) $f(x) = \begin{cases} \dfrac{x - |x|}{x}, & x \neq 0 \\ 2, & x = 0 \end{cases}$ at $x = 0$.

(ii) $g(x) = \begin{cases} \dfrac{\sin 2x}{3x}, & x \neq 0 \\ \dfrac{3}{2} & x = 0 \end{cases}$ at $x = 0$.

(iii) $f(x) = \begin{cases} x^2 \cos(1/x) & x \neq 0 \\ 0 & x = 0 \end{cases}$ at $x = 0$.

(iv) $f(x) = |x| + |x - 1|$ at $x = 1$.

(v) $f(x) = \begin{cases} x - [x], & x \neq 1 \\ 0 & x = 1 \end{cases}$ at $x = 1$.

12. For what value of k, $f(x) = \begin{bmatrix} 3x^2 - kx + 5, & 0 \leq x < 2 \\ 1 - 3x & 2 \leq x \leq 3 \end{bmatrix}$ is continuous $\forall\, x \in [0, 3]$.

13. For what values of a and b

$$f(x) = \begin{cases} \dfrac{x + 2}{|x + 2|} + a & \text{if } x < -2 \\ a + b & \text{if } x = -2 \\ \dfrac{x + 2}{|x + 2|} + 2b & \text{if } x > -2 \end{cases}$$ is continuous at $x = 2$.

14. Prove that $f(x) = |x + 1|$ is continuous at $x = -1$, but not derivable at $x = -1$.

15. For what value of p,

$$f(x) = \begin{cases} x^p \sin(1/x) & x \neq 0 \\ 0 & x = 0 \end{cases}$$ is derivable at $x = 0$.

16. If $y = \frac{1}{2}\left[\tan^{-1}\left(\frac{2x}{1-x^2}\right) + 2\tan^{-1}\left(\frac{1}{x}\right)\right]$, $0 < x < 1$, find $\frac{dy}{dx}$.

17. If $y = \sin\left[2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right]$ then $\frac{dy}{dx} = ?$

18. If $5^x + 5^y = 5^{x+y}$ then prove that $\frac{dy}{dx} + 5^{y-x} = 0$.

19. If $x\sqrt{1-y^2} + y\sqrt{1-x^2} = a$ then show that $\frac{dy}{dx} = -\sqrt{\frac{1-y^2}{1-x^2}}$.

20. If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$ then show that $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$.

21. If $(x + y)^{m+n} = x^m \cdot y^n$ then prove that $\frac{dy}{dx} = \frac{y}{x}$.

22. Find the derivative of $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ w.r.t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$.

23. Find the derivative of $\log_e(\sin x)$ w.r.t. $\log_a(\cos x)$.

24. If $x^y + y^x + x^x = m^n$, then find the value of $\frac{dy}{dx}$.

25. If $x = a\cos^3\theta$, $y = a\sin^3\theta$ then find $\frac{d^2y}{dx^2}$.

26. If $x = ae^t (\sin t - \cos t)$

$y = ae^t (\sin t + \cos t)$ then show that $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is 1.

27. If $y = \sin^{-1}\left[x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}\right]$ then find $-\frac{dy}{dx}$.

28. If $y = x^{\log_e x} + (\log_e x)^x$ then find $\frac{dy}{dx}$.

29. Differentiate x^{x^x} w.r.t. x.

30. Find $\frac{dy}{dx}$, if $(\cos x)^y = (\cos y)^x$

31. If $y = \tan^{-1}\left(\frac{\sqrt{1+\sin x} - \sqrt{1-\sin x}}{\sqrt{1+\sin x} + \sqrt{1-\sin x}}\right)$ where $\frac{\pi}{2} < x < \pi$ find $\frac{dy}{dx}$.

32. If $x = \sin\left(\frac{1}{a}\log_e y\right)$ then show that $(1 - x^2)\, y'' - xy' - a^2 y = 0$.

33. Differentiate $(\log x)^{\log x}$, $x > 1$ *w.r.t.* x

34. If $\sin y = x \sin (a + y)$ then show that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$.

35. If $y = \sin^{-1}x$, find $\frac{d^2y}{dx^2}$ in terms of y.

36. If $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then show that $\frac{d^2y}{dx^2} = \frac{-b^4}{a^2y^3}$.

37. If $y = e^{a\cos^{-1}x}$, $-1 \le x \le 1$, show that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$

38. If $y^3 = 3ax^2 - x^3$ then prove that $\frac{d^2y}{dx^2} = \frac{-2a^2x^2}{y^5}$.

39. Verify Rolle's theorem for the function, $y = x^2 + 2$ in the interval $[a, b]$ where $a = -2$, $b = 2$.

40. Verify Mean Value Theorem for the function, $f(x) = x^2$ in $[2, 4]$

ANSWERS:

1. $x = -7/2$
2. R
3. -1
4. $x = 6, 7$
5. Points of discontinuity of $f(x)$ are 4, 5, 6, 7 *i.e.* four points.
   Note : At $x = 3$, $f(x) = [x]$ is continuous. because $\lim_{x \to 3^+} f(x) = 3 = f(3)$.
6. $\lambda = \frac{7}{2}$.
7. $k = \frac{3}{4}$.
8. $-\cot x$
9. 15
10. (i) $\frac{3}{3x + 5} \log_3 e$ (ii) $e^{\log_2 x} \frac{1}{x} . \log_2 e$.
    (iii) $6 (x - 1)^5$ (iv) 0
    (v) $\frac{7}{2} \frac{x^2 \sqrt{x}}{\sqrt{1 - x^7}}$. (vi) $\frac{-\log_e 5}{x (\log_e x)^2}$.
11. (i) Discontinuous (ii) Discontinuous
    (iii) Continuous (iv) continuous
    (v) Discontinuous
12. k = 11
13. $a = 0, b = -1$.
15. $p > 1$.
16. 0
17. $\frac{-x}{\sqrt{1 - x^2}}$.
22. 1
23. $-\cot^2 x \log_e a$
24. $\frac{dy}{dx} = \frac{-x^x (1 + \log x) - y x^{y-1} - y^x \log y}{x^y \log x + x y^{x-1}}$.

CHAPTER: APPLICATION OF DERIVATIVES

1. The side of a square is increasing at the rate of 0.2 cm/sec. Find the rate of increase of perimeter of the square.
2. The radius of the circle is increasing at the rate of 0.7 cm/sec. What is the rate of increase of its circumference?
3. If the radius of a soap bubble is increasing at the rate of $\frac{1}{2}$cm/sec. At what rate its volume is increasing when the radius is 1 cm.
4. A stone is dropped into a quiet lake and waves move in circles at a speed of 4 cm/sec. At the instant when the radius of the circular wave is 10 cm, how fast is the enclosed area increasing?

5. The total revenue in rupees received from the sale of x units of a product is given by

   $R(x) = 13x^2 + 26x + 15$. Find the marginal revenue when $x = 7$.

6. Find the maximum and minimum values of function $f(x) = \sin 2x + 5$.

7. Find the maximum and minimum values (if any) of the function

   $$f(x) = -|x - 1| + 7 \quad \forall\, x \in R.$$

8. Find the value of a for which the function $f(x) = x^2 - 2ax + 6$, $x > 0$ is strictly increasing.

9. Write the interval for which the function $f(x) = \cos x$, $0 \leq x \leq 2\pi$ is decreasing.

10. What is the interval on which the function $f(x) = \frac{\log x}{x}$, $x \in (0, \infty)$ is increasing?

11. For which values of x, the functions $y = x^4 - \frac{4}{3}x^3$ is increasing?

12. Write the interval for which the function $f(x) = \frac{1}{x}$ is strictly decreasing.

13. Find the sub-interval of the interval $(0, \pi/2)$ in which the function $f(x) = \sin 3x$ is increasing.

14. Without using derivatives, find the maximum and minimum value of $y = |3 \sin x + 1|$.

15. If $f(x) = ax + \cos x$ is strictly increasing on R, find a.

16. Write the interval in which the function $f(x) = x^9 + 3x^7 + 64$ is increasing.

17. What is the slope of the tangent to the curve $f = x^3 - 5x + 3$ at the point whose x co-ordinate is 2?

18. At what point on the curve $y = x^2$ does the tangent make an angle of 45° with positive direction of the x-axis?

19. Find the point on the curve $y = 3x^2 - 12x + 9$ at which the tangent is parallel to x-axis.

20. What is the slope of the normal to the curve $y = 5x^2 - 4 \sin x$ at $x = 0$.

21. Find the point on the curve $y = 3x^2 + 4$ at which the tangent is perpendicular to the line with slope $-\frac{1}{6}$.

22. Find the point on the curve $y = x^2$ where the slope of the tangent is equal to the y – co-ordinate.

23. If the curves $y = 2e^x$ and $y = ae^{-x}$ intersect orthogonally (cut at right angles), what is the value of a?

24. Find the slope of the normal to the curve $y = 8x^2 - 3$ at $x = \frac{1}{4}$.

25. Find the rate of change of the total surface area of a cylinder of radius r and height h with respect to radius when height is equal to the radius of the base of cylinder.

26. Find the rate of change of the area of a circle with respect to its radius. How fast is the area changing w.r.t. its radius when its radius is 3 cm?

27. For the curve $y = (2x + 1)^3$ find the rate of change of slope at $x = 1$.

28. Find the slope of the normal to the curve

$$x = 1 - a \sin \theta \quad ; \quad y = b \cos^2\theta \quad \text{at} \quad \theta = \frac{\pi}{2}$$

29. If a manufacturer's total cost function is $C(x) = 1000 + 40x + x^2$, where x is the out put, find the marginal cost for producing 20 units.

30. Find 'a' for which $f(x) = a\,(x + \sin x)$ is strictly increasing on R.

SHORT ANSWER TYPE QUESTIONS (4 MARKS)

31. A particle moves along the curve $6y = x^3 + 2$. Find the points on the curve at which the y co-ordinate is changing 8 times as fast as the x co-ordinate.

32. A ladder 5 metres long is leaning against a wall. The bottom of the ladder is pulled along the ground away from the wall at the rate of 2 cm/sec. How fast is its height on the wall decreasing when the foot of the ladder is 4 metres away from the wall?

33. A balloon which always remain spherical is being inflated by pumping in 900 cubic cm of a gas per second. Find the rate at which the radius of the balloon increases when the radius is 15 cm.

34. A man 2 meters high walks at a uniform speed of 5 km/hr away from a lamp post 6 metres high. Find the rate at which the length of his shadow increases.

35. Water is running out of a conical funnel at the rate of 5 cm^3/sec. If the radius of the base of the funnel is 10 cm and altitude is 20 cm, find the rate at which the water level is dropping when it is 5 cm from the top.

36. The length x of a rectangle is decreasing at the rate of 5 cm/sec and the width y is increasing as the rate of 4 cm/sec when $x = 8$ cm and $y = 6$ cm. Find the rate of change of

    (a) Perimeter (b) Area of the rectangle.

37. Sand is pouring from a pipe at the rate of 12c.c/sec. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when height is 4 cm?

38. The area of an expanding rectangle is increasing at the rate of 48 cm^2/ sec. The length of the rectangle is always equal to the square of the breadth. At what rate is the length increasing at the instant when the breadth is 4.5 cm?

39. Find a point on the curve $y = (x - 3)^2$ where the tangent is parallel to the line joining the points (4, 1) and (3, 0).

40. Find the equation of all lines having slope zero which are tangents to the curve $y = \dfrac{1}{x^2 - 2x + 3}$.

41. Prove that the curves $x = y^2$ and $xy = k$ cut at right angles if $8k^2 = 1$.

42. Find the equation of the normal at the point (am^2, am^3) for the curve $ay^2 = x^3$.

43. Show that the curves $4x = y^2$ and $4xy = k$ cut as right angles if $k^2 = 512$.

44. Find the equation of the tangent to the curve $y = \sqrt{3x - 2}$ which is parallel to the line $4x - y + 5 = 0$.

45. Find the equation of the tangent to the curve $\sqrt{x}+\sqrt{y}=a$ at the point $\left(\frac{a^2}{4}, \frac{a^2}{4}\right)$.

46. Find the points on the curve $4y = x^3$ where slope of the tangent is $\frac{16}{3}$.

47. Show that $\frac{x}{a}+\frac{y}{b}=1$ touches the curve $y = be^{-x/a}$ at the point where the curve crosses the y-axis.

48. Find the equation of the tangent to the curve given by $x = a \sin^3 t$, $y = b \cos^3 t$ at a point where $t=\frac{\pi}{2}$.

49. Find the intervals in which the function $f(x) = \log (1 + x) - \frac{x}{1+x}$, $x > -1$ is increasing or decreasing.

50. Find the intervals in which the function $f(x) = x^3 - 12x^2 + 36x + 17$ is

    (a) Increasing (b) Decreasing.

51. Prove that the function $f(x) = x^2 - x + 1$ is neither increasing nor decreasing in [0, 1].

52. Find the intervals on which the function $f(x)=\frac{x}{x^2+1}$ is decreasing.

53. Prove that $f(x)=\frac{x^3}{3}-x^2+9x,\ x\in[1,2]$ is strictly increasing. Hence find the minimum value of $f(x)$.

54. Find the intervals in which the function $f(x) = \sin^4 x + \cos^4 x$, $0 \le x \le \frac{\pi}{2}$ is increasing or decreasing.

55. Find the least value of 'a' such that the function $f(x) = x^2 + ax + 1$ is strictly increasing on (1, 2).

56. Find the interval in which the function $f(x) = 5x^{\frac{3}{2}} - 3x^{\frac{5}{2}}$, $x > 0$ is strictly decreasing.

57. Show that the function $f(x) = \tan^{-1}(\sin x + \cos x)$, is strictly increasing on the interval $\left(0, \frac{\pi}{4}\right)$.

58. Show that the function $f(x) = \cos\left(2x + \frac{\pi}{4}\right)$ is strictly increasing on $\left(\frac{3\pi}{8}, \frac{7\pi}{8}\right)$.

59. Show that the function $f(x) = \frac{\sin x}{x}$ is strictly decreasing on $\left(0, \frac{\pi}{2}\right)$.

Using differentials, find the approximate value of (Q. No. 60 to 64).

60. $(0.009)^{\frac{1}{3}}$.

61. $(255)^{\frac{1}{4}}$.

62. $(0.0037)^{\frac{1}{2}}$.

63. $\sqrt{0.037}$.

64. $\sqrt{25.3}$.

65. Find the approximate value of $f(5.001)$ where $f(x) = x^3 - 7x^2 + 15$.

66. Find the approximate value of $f(3.02)$ where $f(x) = 3x^2 + 5x + 3$.

LONG ANSWER TYPE QUESTIONS (6 MARKS)

67. Show that of all rectangles inscribed in a given fixed circle, the square has the maximum area.

68. Find two positive numbers x and y such that their sum is 35 and the product x^2y^5 is maximum.

69. Show that of all the rectangles of given area, the square has the smallest perimeter.

70. Show that the right circular cone of least curved surface area and given volume has an altitude equal to $\sqrt{2}$ times the radium of the base.

71. Show that the semi vertical angle of right circular cone of given surface area and maximum volume is $\sin^{-1}\left(\frac{1}{3}\right)$.

72. A point on the hypotenuse of a triangle is at a distance a and b from the sides of the triangle. Show that the minimum length of the hypotenuse is $\left(a^{\frac{2}{3}} + b^{\frac{2}{3}}\right)^{\frac{3}{2}}$.

73. Prove that the volume of the largest cone that can be inscribed in a sphere of radius R is $\frac{8}{27}$ of the volume of the sphere.

74. Find the interval in which the function f given by $f(x) = \sin x + \cos x$, $0 \leq x \leq 2\pi$ is strictly increasing or strictly decreasing.

75. Find the intervals in which the function $f(x) = (x + 1)^3 (x - 3)^3$ is strictly increasing or strictly decreasing.

76. Find the local maximum and local minimum of $f(x) = \sin 2x - x$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$.

77. Find the intervals in which the function $f(x) = 2x^3 - 15x^2 + 36x + 1$ is strictly increasing or decreasing. Also find the points on which the tangents are parallel to x-axis.

78. A solid is formed by a cylinder of radius r and height h together with two hemisphere of radius r attached at each end. It the volume of the solid is constant but radius r is increasing at the rate of $\frac{1}{2\pi}$metre/min. How fast must h (height) be changing when r and h are 10 metres.

79. Find the equation of the normal to the curve

$x = a (\cos \theta + \theta \sin \theta)$; $y = a (\sin \theta - \theta \cos \theta)$ at the point θ and show that its distance from the origin is a.

80. For the curve $y = 4x^3 - 2x^5$, find all the points at which the tangent passes through the origin.

81. Find the equation of the normal to the curve $x^2 = 4y$ which passes through the point (1, 2).

82. Find the equation of the tangents at the points where the curve $2y = 3x^2 - 2x - 8$ cuts the x-axis and show that they make supplementary angles with the x-axis.

83. Find the equations of the tangent and normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at the point (x_0, y_0).

84. A window is in the form of a rectangle surmounted by an equilateral triangle. Given that the perimeter is 16 metres. Find the width of the window in order that the maximum amount of light may be admitted.

85. A jet of an enemy is flying along the curve $y = x^2 + 2$. A soldier is placed at the point (3, 2). What is the nearest distance between the soldier and the jet?

86. Find a point on the parabola $y^2 = 4x$ which is nearest to the point (2, −8).

87. A square piece of tin of side 18 cm is to be made into a box without top by cutting a square from each cover and folding up the flaps to form the box. What should be the side of the square to be cut off so that the volume of the box is the maximum.

88. A window in the form of a rectangle is surmounted by a semi circular opening. The total perimeter of the window is 30 metres. Find the dimensions of the rectangular part of the window to admit maximum light through the whole opening.

89. An open box with square base is to be made out of a given iron sheet of area 27 sq. meter, show that the maximum value of the box is 13.5 cubic metres.

90. A wire of length 28 cm is to be cut into two pieces. One of the two pieces is to be made into a square and other in to a circle. What should be the length of two pieces so that the combined area of the square and the circle is minimum?

91. Show that the height of the cylinder of maximum volume which can be inscribed in a sphere of radius R is $\frac{2R}{\sqrt{3}}$. Also find the maximum volume.

92. Show that the altitude of the right circular cone of maximum volume that can be inscribed is a sphere of radius r is $\frac{4r}{3}$.

93. Prove that the surface area of solid cuboid of a square base and given volume is minimum, when it is a cube.

94. Show that the volume of the greatest cylinder which can be inscribed in a right circular cone of height h and semi-vertical angle α is $\frac{4}{27}\pi h^3 \tan^2 \alpha$.

95. Show that the right triangle of maximum area that can be inscribed in a circle is an isosceles triangle.

96. A given quantity of metal is to be cast half cylinder with a rectangular box and semicircular ends. Show that the total surface area is minimum when the ratio of the length of cylinder to the diameter of its semicircular ends is $\pi : (\pi + 2)$.

ANSWERS

1. 0.8 cm/sec.
2. 4.4 cm/sec.
3. 2π cm^3/sec.
4. 80π cm^2/sec.
5. Rs. 208.
6. Minimum value = 4, maximum value = 6.
7. Maximum value = 7, minimum value does not exist.
8. $a \leq 0$.
9. $[0, \pi]$
10. $(0, e]$
11. $x \geq 1$
12. $(-\infty, 0) \cup (0, \infty)$
13. $\left(0, \frac{\pi}{6}\right)$.
14. Maximum value = 4, minimum valve = 0.
15. $a > 1$.
16. R
17. 7
18. $\left(\frac{1}{2}, \frac{1}{4}\right)$.
19. $(2, -3)$
20. $\frac{1}{4}$
21. $(1, 7)$
22. $(0, 0), (2, 4)$
23. $\frac{1}{2}$.
24. $-\frac{1}{4}$.
25. $6\pi r$
26. 2π cm^2/cm
27. 72
28. $-\frac{a}{2b}$.
29. Rs. 80.
30. $a > 0$.
31. $(4, 11)$ and $\left(-4, -\frac{31}{3}\right)$.
32. $-\frac{8}{3}$ cm/sec.
33. $\frac{1}{\pi}$ cm/sec.
34. 2.5 km/hr.
35. $\frac{4}{45\pi}$ cm/sec.
36. (a) -2 cm/min, (b) 2 cm^2/min
37. $\frac{1}{48\pi}$ cm/sec.
38. 7.11 cm/sec.
39. $\left(\frac{7}{2}, \frac{1}{4}\right)$.
40. $y = \frac{1}{2}$.
42. $2x + 3my = am^2 (2 + 3m^2)$
44. $48x - 24y = 23$
45. $2x + 2y = a^2$
46. $\left(\frac{8}{3}, \frac{128}{27}\right), \left(\frac{-8}{3}, -\frac{128}{27}\right)$.
48. $y = 0$
49. Increasing in $(0, \infty)$, decreasing in $(-1, 0)$.
50. Increasing in $(-\infty, 2) \cup (6, \infty)$, Decreasing in $(2, 6)$.

52. $(-\infty, -1)$ and $(1, \infty)$.

53. $\frac{25}{3}$.

54. Increasing in $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$ Decreasing in $\left(0, \frac{\pi}{4}\right)$.

55. $a = -2$.

56. Strictly decreasing in $(1, \infty)$.

60. 0.2083

61. 3.9961

62. 0.06083

63. 0.1925

64. 5.03

65. −34.995

66. 45.46

68. 25, 10

74. Strictly increasing in $\left[0, \frac{\pi}{4}\right) \cup \left(\frac{5\pi}{4}, 2\pi\right]$

Strictly decreasing in $\left(\frac{\pi}{4}, \frac{5\pi}{4}\right)$.

75. Strictly increasing in $(1, 3) \cup (3, \infty)$

Strictly decreasing in $(-\infty, -1) \cup (-1, 1)$.

76. Local maxima at $x = \frac{\pi}{6}$

Local max. value $= \frac{\sqrt{3}}{2} - \frac{\pi}{6}$

Local minima at $x = -\frac{\pi}{6}$

Local minimum value $= \frac{-\sqrt{3}}{2} + \frac{\pi}{6}$

77. Strictly increasing in $(-\infty, 2] \cup [3, \infty)$

Strictly decreasing in $(2, 3)$.

Points are (2, 29) and (3, 28).

78. $-\frac{3}{\pi}$metres/min.

79. $x + y\tan\theta - a\sec\theta = 0$.

80. (0, 0), (−1, −2) and (1, 2).

81. $x + y = 3$

82. $5x - y - 10 = 0$ and $15x + 3y + 20 = 0$

83. $\frac{xx_0}{a^2} - \frac{yy_0}{b^2} = 1$, $\frac{y - y_0}{a^2 y_0} + \frac{x - x_0}{b^2 x_0} = 0$.

84. $\frac{16}{6 - \sqrt{3}}$

85. $\sqrt{5}$

86. (4, −4)

87. 3cm

88. $\frac{60}{\pi + 4}$, $\frac{30}{\pi + 4}$.

90. $\frac{112}{\pi + 4}$cm, $\frac{28\pi}{\pi + 4}$cm.