8096

Ph.D. ENTRANCE EXAMINATION, NOVEMBER 2009

Time : 140 Minutes | Max. Marks : 160

Section – B & C

(This is to test the candidate's capability of defining concepts through short answers.)

Note : *1) Anser **any twelve** questions from Section **B** and **one** question from Section **C** in the subject concerned.*
*2) In Section **B** **each** question carries **10** marks. Section **C** carries **40** marks.*
*3) In Section **B** an answer should not exceed **100** words. In Section **C** an answer should not exceed **500** words.*
*4) The candidates are **permitted** to answer questions **only** from the subject that comes under the **faculty** in which he/she seeks registration as indicated in the **application** form.*
*5) The candidates should **clearly** indicate the **Section** and **question paper number** in the answer paper.*

FACULTY OF ARTS
1. English

SECTION – B

1. Absurd Theatre
2. Pathetic Fallacy
3. Stream of Consciousness
4. Mock Epic
5. Point of View
6. Free Verse
7. Metaphysical Poetry
8. Structuralist Criticism
9. Elegy
10. Ecriture Feminine
11. Realism
12. Comedy of Humours
13. Transformational-Generative Grammar

14. Closet Drama
15. Deconstruction
16. Utopias and Dystopias

SECTION – C

1. Examine the impact of Marxism on literary theory.
2. What are the hallmarks of postmodern fiction ? Give illustrative examples.
3. Discuss the impact of cultural studies on the study of literature.
4. Consider how the present day emphasis on communicative language teaching has replaced the notion of 'correctness' with 'appropriateness'.

2. German

SECTION – B

1. Merkantilismus
2. Wartburg in Thüringen
3. "Brücke Maler"
4. Soldatenkönig
5. Der Ackermann aus Böhmen
6. Imperium Romanum
7. Ulfilas
8. Das junge Deutschland
9. Der Abenteurliche Simplizissimus
10. Johann Gottfried Herder
11. Höfisches Epos
12. die Romantik
13. *logos*
14. Pragmatik
15. Franz Bop
16. Positivismus
17. Scholastik

SECTION – C

I. Parabase

Freudig war, vor vielen Jahren,
Eifrig so der Geist bestrebt,
Zu erforschen, zu erfahren,
Wie Natur im Schaffen lebt.
Und es ist das ewig Eine,
Das sich vielfach offenbart;
Klein das Große, groß das Kleine,
Alles nach der eignen Art.
Immer wechselnd, fest sich haltend;
Nah und fern und fern und nah;
So gestaltend, umgestaltend –
Zum Erstaunen bin ich da.

II. Frühlingsfeier

Das ist des Frühlings traurige Lust!
Die blühenden Mädchen, die wilde Schar,
Sie stürmen dahin, mit flatterndem Haar
Und Jammergeheul und entblößter Brust: -
Adonis! Adonis!

Es sinkt die Nacht. Bei Fackelschein
Sie suchen hin und her im Wald,
Der angstverwirret widerhallt
Von Weinen und Lachen und Schluchzen und Schreien:
Adonis! Adonis!

Das wunderschöne Jünglingsbild,
Es liegt am Boden blaß und tot,
Das Blut färbt alle Blumen rot,
Und Klagelaut die Luft erfüllt:-
Adonis! Adonis!

III. Das Huhn

In der Bahnhofhalle, nicht für es gebaut,
Geht ein Huhn
Hin und her...
Wo, wo ist detr Herr Stationsvorsteh'r?
Wird dem Huhn
Man nichts tun?
Hoffen wir es! Sagen wir es laut:
Daß ihm unsre Sympathie gehört,
Selbst an dieser Stätte, wo es – „stört"!

3. Russian

SECTION – B

1. Расскажите об известных вам типах словарей русского языка. Охарактеризуйте их цель и содержание.
2. Расскажите о видах предложений в русском языке.
3. Охарактеризуйте фонетическую систему русского языка: систему гласных и согласных звуков речи
4. Охарактеризуйте основные способы образования слов. Докажите, что словообразование – источник непрерывного пополнения словарного запаса родного языка.
5. Понятие о частях речи.
6. «Слово о полку Игореве» – призыв к единению Русской земли.
7. Автор и его герой в романе А.С. Пушкина «Евгений Онегин».
8. «Герой нашего времени» М.Ю. Лермонтова как психологический роман.
9. Проблематика романа И.А. Гончарова «Обломов».
10. Как понимают счастье герои и автор поэмы Н.А. Некрасова «Кому на Руси жить хорошо»?
11. Тема революции в поэме А.А. Блока «Двенадцать».
12. Гуманизм романа Ф.М. *Достоевского «Преступление и наказание».*
13. Образ Базарова в романе И.С. Тургенева «Отцы и дети», его авторская оценка.
14. Прошлое, настоящее, будущее в пьесе А.П. Чехова «Вишневый сад».
15. Методика преподавания русского языка как иностранного. Предмет методики.
16. Речевая деятельность.

SECTION – C

1. Расскажите о лексике как разделе лингвистики. Охарактеризуйте основные группы лексики русского языка: а) синонимы, антонимы, омонимы; б) устаревшие слова и неологизмы; в) исконно русские и заимствованные слова.

2. Основные черты социалистического реализма. В чем выражается новаторство литературы социалистического реализма?

3. Женские образы романа «Война и мир».

4. Journalism and Communication

SECTION – B

1. Principles of Congruity
2. Corporate Communication
3. Surveillance Function
4. Unit of Analysis
5. Precision Journalism
6. Participatory Communication
7. Frequency Spectrum
8. Interactive Media
9. Embedded Journalism
10. Media Convergence
11. ASCI
12. World Space Radio
13. Cultivation Theory
14. Dominant paradigm of development
15. Quasi-experimental design
16. Client briefing.

SECTION – C

1. Experimental design is suitable for studying what type of problems in Media Research ? Discuss the steps to be followed in conducting a study using experimental type of design.
2. State the difference in approach and application between Qualitative and Quantitative Research in mass communication
3. What are the principles and procedures of Random sampling method used in Media research ? Discuss your answer with the help of suitable examples.

5. Philosophy

SECTION – B

1. Allegory of the Cave
2. Matter and Form
3. Normative ethics
4. Pragmatism
5. Analytic Philosophy
6. Phenomenology
7. Existentialism
8. Post modernism
9. Truth and validity
10. Inference
11. Ockam's razor
12. Critical Philosophy
13. Prescriptivism
14. Sadhana Catustaya
15. Apratak siddhi
16. Astanga yoga

SECTION – C

1. Prepare a synopsis on a topic of research in Indian Philosophy.
2. Discuss the scope of research in Applied Philosophy.
3. Account for the relevance of methods in Philosophical research.

6. Library and Information Science

SECTION – B

1. Brain storming method
2. Information literacy
3. Indian copy right Act
4. Institutional repository
5. POSDCORB
6. Science indicators
7. Chain procedure
8. Web 2.0
9. Search strategy
10. Metadata
11. Citation analysis
12. Library consortia
13. SWOT analysis
14. INFLIBNET
15. Classic laws of bibliometrics
16. Geographical sources.

SECTION – C

1. Discuss the factors affecting the selection of a research problem.
2. What is sampling ? What are the characteristics of a good sample ?
3. Discuss the structure and organization of a research report.

FACULTY OF COMMERCE

7. Commerce

SECTION – B

1. Pros and Cons of Globalisation.
2. Customer Relationship Management.
3. Supply Chain Management.
4. SWOT Analysis.
5. Foreign Direct Investment.
6. Hypothesis Testing.
7. Electronic Payment System.
8. Venture Capital.
9. Mergers and Acquisitions.
10. Portfolio Management.
11. Grapewine.
12. MBO.
13. Focussed Interview.
14. Scaling Techniques.
15. Corporate Governance.
16. Quality Circle.

SECTION – C

1. Explain the objectives of research in social science.
2. Discuss the sources from which research problems are identified.
3. Why should inflation be controlled ? Explain the various measures to be adopted to control it.
4. Discuss the social responsibility of business.

FACULTY OF EDUCATION

8. Education

SECTION – B

1. What are the progressive features of basic education ?
2. "Senses are the gateways of knowledge and inorder to educate the child, appeal through his senses". Explain the meaning of this statement.
3. What are the characteristics of a good personality ? Explain any two different methods for assessing the personality.
4. What are the hurdles in the path of education functioning as an instrument of social change in India ?
5. Citing examples distinguish between an "Objective Test" and an "Objective Based Test".
6. Will punishment prevent the repetition of mistakes in learning ? Why ?
7. What are the advantages and disadvantages of Computer Assisted Instruction ?
8. What suggestions would you offer to promote women's education in India ?
9. What is 'Null Curriculum' ? Explain the concept with examples and discuss its educational implications.
10. Distinguish the meaning, purposes and activities of Vocational guidance and Educational guidance.
11. Explain the nature, scope and functions of Educational Philosophy.
12. Distinguish between summative evaluation and formative evaluation with suitable examples.
13. Briefly discuss the role of freedom in educational institution.
14. What is the feasibility of "Module Approach" in Indian conditions for classroom instruction ?

15. List out the various components of Multiple Intelligence as suggested by H. Gardner.

16. Explain in detail the steps you would adopt in organizing an educational seminar for teacher educators.

SECTION – C

1. a) Explain the characteristics of Experimental Research.

   b) Discuss the criteria for objective assessment of a research report.

   c) Describe the various measures of central tendency and variability commonly used in Educational Research.

2. You are asked to prepare a research proposal. Suggest the details of your procedure in terms of :

   a) Selection of the problem.

   b) The hypothesis/hypotheses to be formulated.

   c) Tools required for the collection of data.

   d) Sampling procedure.

   e) Analysis of data.

3. Write short notes on the following :

   a) Use of factor analysis in educational research.

   b) Criteria for selecting a problem for educational research.

   c) Main goals of educational research.

   d) Properties of the “Normal Curve”.

   e) “Raw score”, “Z-score”, “Standard score” and “T-score”.

FACULTY OF ENGINEERING AND TECHNOLOGY

M.Sc. (Engineering) By Research

9. Civil Engineering

SECTION – B

***Use** of calculator is **permitted**.*

1. Draw the shear force and Bending Moment diagram for the beam shown in the figure.

2. The roof slab system for a hall consists of beams placed at 3 m centre to centre. The effective span of the beam is 8 m. The thickness of slab is 120 mm. The size of the beam below the slab is 230 mm width and 380 mm depth. The beam is reinforced with 2 nos. 32 mm dia steel bars of grade 415 N/mm^2. Compute the maximum total load/m run, the beam can carry, including its own weight. Grade of concrete is M25.

3. A circular column of M20 grade concrete and 300 mm diameter has 8 nos of 12 mm diameter Fe 415 grade steel bars as longitudinal reinforcements. The length of the column is 7 m. If its ends are effectively held in position, determine the strength of the column.

4. Explain how the design of cement concrete mix is carried out in the laboratory.

5. Observations were taken to determine the gradient between two points A and B by setting up a theodolite at another station C and keeping the staff vertical.

Staff at	Vertical Angle	Stadia Reading
A	+4°29´0´´	1.300, 1.600, 1.900
B	+0°10´40´´	1.100, 1.400, 1.700

6. What is meant by closing errors in a closed traverse ? How these errors can be adjusted ?

7. An area of 40000 ha has to be irrigated by a canal system for growing banana in 15000 ha and paddy in 25000 ha. The peak water requirement of banana and paddy is 12 cm/month and 16 cm/month respectively and these peak demands occur at the same month. Design a suitable canal system using Lacey's method. Adopt a silt factor of 1.05 and side slope of 0.5 H:1 V.

8. Explain the Unit Hydrograph.

9. A log of wood 30 cm diameter and 100 cm is floating in fresh water. If the specific gravity of wood is 0.5, determine the depth of immersion.

10. Explain how the plate load test is carried out. How the results of the test are used in design of pavements ?

11. a) A fill deposit is having cohesion value of 30 kN/m^2 and angle of internal friction of 30°. What is the shear stress when the fill is subjected to an external load (normal load) of 100 KN/m^2 ?

    b) A normally consolidated clay layer settled by 25 mm when the effective stress was increased from 50 to 100 KN/m^2. What will be its settlement when the effective stress is increased from 100 to 150 KN/m^2.

12. A horizontal stratified soil deposit consists of 3 layers each uniform in itself. The permeabilities of these layers are 8×10^{-3} mm/sec, 52×10^{-3} mm/sec. and 6×10^{-3} mm/sec and their thickness are 7 m, 3 m and 10 m respectively. Determine the average permeability of the soil deposit in horizontal and vertical directions.

13. Soil has been compacted in an embankment at a bulk density 21.5 kN/m^3 and a water content of 12%. Specific gravity of soil is 2.65. The water table is well below the foundation level. Estimate the dry density, void ratio, degree of saturation of the compacted soil.

14. Explain the planning principle of New Delhi city.

15. Discuss the different systems that can be adopted while planning road system in new cities.

16. What are the effects of air pollution in cities and how the problem can be reduced ?

17. a) There is a horizontal curve of radius 150 m on a highway with a design speed of 80 kmph. Is this curve safe ? Determine the super elevation required.

    b) Briefly explain the concept of *passenger car unit*.

18. a) Explain the design procedure for designing a septic tank.

    b) Why COD is greater than BOD ?

19. a) Why extra widening of the carriageway is provided on curves ?

    b) Differentiate between flexible and rigid pavements.

20. What are the different joints provided on concrete pavements ? Explain with figures.

21. Explain the different methods of treating municipal waste.

22. Explain how the PERT can be made use in reducing the duration of a project.

23. Draw the sketch of a clover leaf intersection and discuss the advantages and disadvantages of clover leaf with at-grade intersections.

24. Explain how O-D survey is carried out and how the OD matrix is useful in planning the road network in cities.

SECTION – C

1. Explain the research methodology for finding out the effect of poor quality sand in concrete.

2. What are the essential chapters in a thesis report ? Explain the content of each chapter.

3. Explain briefly the features and potential use of Artificial Neural Network in carrying out research in Civil Engg.

10. Electronics and Communication

SECTION – B

1. Source Coding
2. Optical sources
3. Data networks
4. Nyquist's stability criterion
5. VHDL
6. Cryptography
7. Instrumentation amplifier
8. Notch filters
9. Finite World length effects in DSP.
10. Dual gate MOSFET
11. Matched filters
12. Genetic algorithm
13. Microcontroller in embedded systems
14. Directional antennas
15. Image segmentation
16. Wavelength Division multiplexing.

SECTION – C

1. Data compression - efficient techniques
2. Applications of Neural networks
3. Recent advances in Mobile Communication.

11. Electrical and Electronics

SECTION – B

1. How do you compare the efficiency of a transformer with an electric motor of equal power rating ?
2. What is meant by all-day-efficiency in transformers ? Where is it relevant ?
3. Bring out the difference between operation of an ordinary power diode and a zener diode.
4. Why capacitor compensation is used in transmission lines ?
5. How does a solar cell work ?
6. Why compact fluorescent lamps are energy efficient compared to incandescent bulbs ?
7. How will you synchronize an alternator with the supply mains ?
8. Why induction generators are used for wind electricity generators ?
9. List out (detailed explanation not needed) the various methods of voltage control in power systems.
10. Comment on coupling coefficient of a transformer.
11. If a dc generator fails to build up voltage, what could be the probable reasons ?
12. Why 3-phase ac motors should run in the reverse direction if two supply phases are interchanged ?
13. Bring out the difference between the low-pass, high-pass and band-pass filters.
14. How will you distinguish between a linear system and a non-linear system ?
15. What is the significance of common mode rejection ratio (CMRR) in operational amplifiers ?
16. What are the main reasons for harmonics in power system ?

SECTION – C

1. Why peak load control is important in power systems ? Describe various methods to achieve it.
2. Describe the scope of energy conservation and management in Kerala. Suggest effective steps to achieve it.
3. Describe the modern trends in direct solar energy utilization.

12. Computer Science

SECTION – B

1. Differentiate between an Assembler and a Compiler.
2. What are Macros ? Explain.
3. Write notes on Interrupt masking.
4. Explain memory fragmentation.
5. Explain the main features of an OOP language.
6. Write an algorithm to convert NFA to DFA. Show an example.
7. Explain the Evolutionary model of software life cycle.
8. What is meant by Beta Testing ? Explain.
9. What is meant by thrashing ?
10. What are the conditions for avoiding deadlocks ?
11. Discuss Dining Philosophers problem.
12. Discuss leaky bucket algorithm.
13. Describe Process Control Block.
14. Give the criteria for evaluating a process scheduling algorithm.
15. Describe the memory hierarchy in a typical computer.
16. Write notes on Domain Name Systems.

SECTION – C

1. Explain any one research issue in Web Mining with suggestions for addressing it.
2. Explain Grid Computing and discuss any one research issue in it.
3. Discuss a research problem of your choice in the field of Computer Science and directions for tackling it.

13. Mechanical Engineering

SECTION – B

1. Distinguish between vapour absorption and vapour compression refrigerators.
2. Explain the working of a mono pump.
3. What is MPFI in a car ?
4. Explain the break-even diagram.
5. Explain how the true length of a line inclined to HP and VP can be measured.
6. What are common defects in casting ? What are the remedial actions ?
7. Distinguish between centrifugal and inertia type governors.
8. Explain different types of vertical axis windmills.
9. What is an ISHIKAWA diagram ?
10. Explain the concept of "Process capability" in quality control.
11. Draw the performance characteristics of a diesel engine and explain the same.
12. Compare steam turbines and gas turbines used for power generation.
13. Explain line organisation and functional organisation.
14. What is isometric projection ? What is its practical use ?
15. Compare different propulsion methods for aircraft.
16. Compare solid and liquid fuels used for rocket propulsion.

SECTION – C

1. It is imperative for Kerala State to develop potential sources for the development of electricity. How do you foresee Kerala's energy scenario after 20 years considering sources like Hydel, Thermal, Non-conventional Energy, etc.

2. Write in detail how you will conduct a Kerala-wide sample survey to determine our people's dwelling pattern, use of energy and water , travelling habits etc. What will be your sample size ? Estimate the cost involved and time required.

3. Kerala's Tertiary (Service) Sector is now way ahead of primary and secondary sectors. Is it desirable to reverse this trend so as to obtain self-sufficiency in agriculture ?

Ph.D. ENGINEERING

14. Civil Engineering

SECTION – B

1. A metal rod 25 mm diameter and 200 mm long is subjected to axial load P and temperature rise 50°C. Calculate the magnitude and direction of P, if an axial extension of 0.5 mm is measured in the rod corresponding to the above conditions.
   Take $\alpha = 12\times10^{-6}$/°C and $E = 2\times10^{5}$ MPa.
2. The properties of homogenous subsoil are : cohesion = 36 KPa, angle of internal friction = 0°, unit weight = 18 kN/m^3. Determine the maximum depth up to which a vertical cut can be made in this subsoil without causing failure.
3. Derive the relationship between major principal stress, minor principal stress, cohesion and angle of internal friction of soil.
4. Describe in brief various tests conducted for physical examination of water.
5. A rectangular sewer with width 1.5 times its depth is hydraulically equivalent to a circular one. Find the relation between the width of rectangular sewer and the diameter of the circular sewer.
6. a) Why coagulants are used in the sewage treatment ? Name a few common coagulants used. Describe a method of application of any one of the coagulants.
   b) Calculate kg of alum needed per day if alum dose is 28.6 mg/l and the flow is 18 M l/day.
7. A pile 5 m long weighing 2 kN/m is to be designed the hoisting on two hooks placed at same distance from its ends. Find the position of these hooks so that the pile is subjected to smallest possible bending moment.
8. The difference in water level between two tanks is 40 m and they are connected by a pipe line of 2 km long and 20 cm in diameter. For increasing the water supply :
   a) It is proposed to replace 20 cm line by 30 cm diameter line for the entire length

      OR

   b) A new pipeline of 30 cm for 1 km and old pipes of 20 cm laid parallel for the remaining 1 km length.

   Find the percentage increase in supply for both the arrangements.

   Take $f_{new} = 0.008$ and $f_{old} = 0.01$.

9. The estimated bearing capacity of a square footing [1.5 m × 1.5m] resting at a depth of 1 m on a sand deposit is 600 kN/m^2 when the water table is far below the base of the footing. Estimate the bearing capacity [in kN/m^2] when the water level rises to depths of 3 m, 2 m and 1 m below the ground level.

10. Estimating peak discharge of a river at X, the catchment area was divided in to four parts A, B, C, D. Time of concentration and area for different parts are

Part	Time of concentration (hr.)	Area in sq.m.
A	1	600×10^4
B	2	750×10^4
C	3	1000×10^4
D	4	1200×10^4

Records for a rain storm lasting for 4 hours as observed and run off factor during different hours are as follows :

Time (hr.)	Rainfall (mm)	Run off Factor
0-1	25	0.5
1-2	50	0.7
2-3	23.5	0.8
3-4	23.5	0.85

Calculate maximum flow to be expected at X in cumecs assuming a constant base flow of 42.5 cumecs.

11. Design most economical cross section for a trapezoidal channel.

12. A simply supported beam of span 4 m is carrying a uniformly varying load with maximum ordinate 20 kN at centre. Calculate the maximum deflection and slope in the beam. Assume EI = 833 kNm^2.

13. What do you understand by the 'elements' of a curve ? Establish the salient relationships among the different elements of a curve.

14. a) Briefly outline the classification of roads as suggested in the Nagpur road plan.
    b) Calculate the extra width of pavement required on a horizontal curve of radius 700 m on a two lane highway, the design speed being 80 kmph. Assume wheel base, l = 6m.

15. Differentiate between electronic theodolite and optical theodolite.
16. Define Schedule of rates. Discuss the importance of schedule of rates in abstract of rate preparation.
17. Discuss different type of estimate.
18. Define :
    a) Head event
    b) Tail event
    c) Successor event
    d) Predecessor event.
19. Explain PERT and CPM network methods.
20. State and explain D' Alembert's principle.
21. A continuous beam ABC having length AB 6 m and BC 4 m is simply supported at A, B and C. Draw the influence line for BM and SF at a section 2 m from the left support A.
22. Write a short note on site plan. What are the documents to be submitted for getting the building permit ?
23. In a reciprocal levelling across a river two pegs A and B are fixed. With the instrument near A, staff readings at A and B are 0.550 m and 0.710 m respectively. Then with the instrument near B, staff readings at B and A are 1.520 and 2.270 m respectively. Calculate the true difference of level between A and B.
24. What are infiltration galleries ? Discuss detailed investigation for design of infiltration galleries.

SECTION – C

1. Among the Southern States of India, Kerala stands first in road accidents rate. Suggest technical solutions to solve this problem.
2. Explain the different steps in research methodology by selecting any research topic of your interest.
3. World is passing through an economic recession. How does this situation affect civil engineering field ? Steps needed to overcome this situation.

15. Electronics and Communication

SECTION – B

1. Spectral estimation.
2. Low voltage low power circuit realisation.
3. Image denoising.
4. Burst error correction.
5. Security in data communication.
6. Digital PLL.
7. Gunn effect diodes.
8. Microstrip antennas.
9. Fiber optic links.
10. Power MOSFET.
11. Silicon bilateral switch.
12. FIR filters.
13. Digital water marking.
14. Threshold voltage control in MOSFET.
15. Pattern recognition.
16. Microcontrollers.

SECTION – C

1. Design of VLSI circuits – recent trends.
2. Engineering applications of Fuzzy logics.
3. Embedded system design.

16. Electrical and Electronics Engineering

SECTION – B

1. What are the parameters influencing electrical power transmission over long distances ?
2. Why do we calibrate measuring instruments ?
3. What is meant by high efficiency motors ? How do these differ from ordinary commercial motors in terms of its construction ?
4. Describe the operation of a solar cell. What are the recent developments in this area ?
5. What is meant by insulation coordination in any electrical system / apparatus ?
6. Describe the relevance of time-of-day (ToD) metering of electrical energy.
7. What is a gas insulated substation ? Where is it relevant ?
8. What is meant by universal logic circuit ?
9. Why edge-triggering is needed in computer circuits rather than level-clocking ?
10. When do we prefer slip-ring induction motor compared to squirrel cage induction motor ?
11. Why negative feedback is invariably used with operational amplifiers ?
12. How two wattmeters can measure power in a 3-phase circuit ?
13. How do you compare fuel cell with ordinary storage batteries ?
14. What is superconductivity ? What are its important applications ?
15. Compare static RAM and dynamic RAM.
16. Draw the logic circuit and show the truth table of a two input XOR gate. How is it different from OR gate ? Mention one application.

SECTION – C

1. Modern trends in electric lighting.
2. What are the renewable energy sources available in India ? Suggest a plan to utilize the most promising renewable energy sources for Kerala.
3. Describe the importance and measures for power factor control in electricity distribution systems.

17. Computer Science

SECTION – B

1. Describe the major tasks performed in Lexical Analysis.
2. Differentiate between memory segmentation and Paging.
3. Write notes on Code optimization.
4. Explain the sequence of operations when a processor is interrupted.
5. Differentiate between Intel 8085 and 8086 processors.
6. Explain Quick Sort algorithm with an example.
7. Write a C function for binary search.
8. Give an algorithm to reverse all the links in a singly linked list.
9. Describe polymorphism in the context of OOP languages.
10. Differentiate between hardwired and micro-programmed Control Unit implementation.
11. Describe TCP/IP network model with its major differences from ISO/OSI model.
12. Explain the Evolutionary model of software life cycle.
13. Describe an embedded system with an example.
14. Describe the architecture of a Rule based expert system.
15. Give the architecture of a Hopfield Neural Network.
16. Write notes on Grid Computing.

SECTION – C

1. Discuss research issues in developing algorithms for efficient information retrieval from the Web.
2. Discuss issues to be addressed for distributed storage and sharing of data across diverse network domains.
3. Discuss a research problem of your choice in the field of Computer Science and directions for tackling it.

18. Mechanical Engineering

SECTION – B

1. Explain the principle of increase of entropy.
2. What is MRP – II ? How does it differ from MRP – I ? Explain.
3. Explain the time-temperature – transformation diagram for eutectoid steel.
4. List the theories of failure and explain the theory of failure suitable for design of a brittle machine element.
5. Explain a method of measuring very high temperature.
6. Describe six sigma management in quality control.
7. What is Computer Integrated Manufacturing (CIM) ? What are its advantages and disadvantages ?
8. Explain the principle of hydrodynamic lubrication.
9. Briefly explain the major elements of a data acquisition and processing system.
10. What is Knowledge Process Outsourcing (KPO) ? What are the challenges in KPO ?
11. Explain the various tool angles of a single point tool.
12. Explain the different types of free vibration and the types of stress produced in each type of free vibration.
13. What is dimensional analysis ? Explain, how dimensional analysis is done using Buckingham-Pi theorem.
14. Define benchmarking and describe benchmarking process.
15. Explain the working principle of autocollimator. What are its uses ?
16. Explain the phenomenon of interference in involute gears. What are the conditions to be satisfied in order to avoid interference.

SECTION – C

1. "Sustainable energy is the solution to provide humanland with energy-derived advantages without damaging the environment, affecting societal stability or threatening the well being of future generation". Comment on the above statement.

2. "Engineering education and research have placed an increased emphasis on the ability of an individual to perform a theoretical analysis of a problem". Evaluate this argument in the light of advanced computing power available today.

3. Invasion of electronics in the field of mechanical engineering has brought about impressive changes in the functioning of several mechanical equipments. Discuss the recent developments to support the above statement.

19. Chemical Engineering

SECTION – B

1. Find the weight of LPG of composition 60% propane and 40% butane when confined to a 3 m^3 cylinder at 8 atm gauge pressure at room temperature. Assume that the weight of the cylinder is 11.13 kg.

2. A mixture of ether vapour and nitrogen contains 50% ether by volume. Calculate the relative saturation and percentage saturation of the mixture at 295 K and a pressure of 750 mm Hg. Vapour pressure of ether at 295 K is 440 mm Hg.

3. Calculate the heat of reaction for the following reaction
   $CO_2 + 4H_2 \rightarrow 2H_2O + CH_4$ at 500°C with the data given below :
   Standard heat of reaction is – 39,433 kcal kg $mole^{-1}$

Temperature °C	CO_2	H_2	H_2O	CH_4
25	218	172	200	210
500	5340	3499	4254	5730

   Table shows the Enthalpy values in Kcal kg $mole^{-1}$.

4. An oil of kinematic viscosity 0.744 stoke and density $880 \frac{kg}{m^3}$ is flowing through a pipeline of 30 cm diameter at the rate of $7 \frac{m^3}{sec}$. Calculate the wall shear stress and the maximum velocity.

5. A venturimeter having a throat diameter of 100 mm is fitted into a pipeline which has a diameter of 250 mm through which oil of specific gravity 0.95 flows. The pressure difference between the entry and the throat tappings is measured by a manometer containing mercury and the connections were filled with oil flowing in the pipe line. If the difference in level indicated by mercury is 0.63 m, calculate the theoretical volumetric flow rate. The venturi coefficient is 0.95.

6. With the help of a neat sketch, explain the working principle of a cyclone separator. What are its advantages and disadvantages ?

7. Explain the terms COD and BOD. How are these determined in laboratories ?

8. Determine the terminal settling velocity of quartz spheres, 1 mm in diameter in water. Assume free settling. Density of quartz is 2.65 $\frac{gm}{cc}$. Viscosity of water may be assumed to be 1 centipoise and density $1\frac{gm}{cc}$.

9. A mixture of components A and B containing 40% A is to be separated by fractional distillation using a reflux ratio twice the minimum. The column is provided with a total condenser and the feed enters at its boiling point. Determine the number of theoretical plates required if the distillate and residue contain 92 percent A and 3 percent A respectively. The equilibrium data at the operating presure is as follows :

   x : 0.1 0.2 0.4 0.6 0.8 0.9

   y : 0.22 0.39 0.63 0.79 0.91 0.96

   (Graph paper must be provided to do problem No : 9)

10. A steam pipe of 16 cm ID and 17 cm OD is covered by two layers of insulation. The thickness of the first layer is 3 cm and that of the second layer is 5 cm. The thermal conductivities of the pipe, and insulating materials are (58.15), (0.175, and 0.093) $W/m\circ c$ respectively. The temperatures of steam in the pipe is 300°C while the outer temperature is 50°C. Determine the heat lost from the pipe and also the intermediate temperatures.

11. 3000 kg/hr of dry saturated steam at 325 K condenses in a single pass condenser. The tubes have 25 mm OD and 22.5 mm ID. Its thermal conductivity is $105\frac{W}{m-K}$. Water enters at 300 K and leaves at 315 K. Assume that the steam side coefficient is $4.652\frac{KW}{m^2.K}$ and waterside film coefficient is $0.582\frac{KW}{m^2.K}$. Calculate the area required on the basis of the outside diameter of the tube. Latent heat of steam is $2380\frac{KJ}{Kg}$.

12. A first order homogeneous gas phase reaction $A \rightarrow 2.5\ R$ is carried out in an isothermal constant pressure batch reactor at 2 atm. With 20% inerts present, the volume of the reaction mixture increases by 60% in 20 minutes. If the reaction is carried out in a constant volume batch reactor, starting with an initial pressure of 5 atm (out of which 2 atm consists of inerts), find the time required for the pressure to reach 8 atm.

13. Acetaldehyde is to be decomposed in plug flow reactor operating at 520°C and 1 atm. The reaction stoichiometry is $CH_3 - CHO \rightarrow CH_4 + CO$. Under these conditions, the reaction is known to be irreversible with a rate constant of $0.43 \frac{m^3}{kgmole - sec}$. If $0.10 \frac{kg}{sec}$ of pure acetaldehyde is fed to the reactor, determine the volume of the reactor necessary to achieve 35% decomposition.

14. Explain in detail the principle, working and types of thermocouples.

15. Derive the following equations :

    a) $ds = \frac{Cp}{T} dT - \left(\frac{\partial V}{\partial T}\right)_P dp$

    b) $\left(\frac{\partial H}{\partial P}\right)_T = V - T\left[\frac{\partial V}{\partial T}\right]_P$

    c) $C_P - C_V = \frac{\beta^2 VT}{K}$ where β is the coefficient of volume expansion and K is the coefficient of isothermal compressibility.

16. Explain the concept of feedback control giving suitable examples.

SECTION – C

1. What is reforming of Petroleum ? Describe with a neat sketch, a reforming process used in India for straight run gasoline.

2. A Bingham fluid is flowing through a vertical tube as a result of pressure gradient. The radius and length of the tube are R & L respectively. Derive an expression for the velocity profile in the tube. End effects are neglected.

3. With a neat sketch, explain the working principle of a Nuclear Reactor. Discuss the advantages and disadvantages of nuclear power usage.

FACULTY OF FINE ARTS

20. Music

SECTION – B

1. Lakshana of the raga Gowri Manohari.
2. Utsavaprabanda of Sri Svati Tirunal.
3. Nritya natakas.
4. Four part harmony.
5. Navavarana krities of Dikshitar.
6. Mitra ragas.
7. Yamakam.
8. Brindaganam.
9. Margi and Desitalas.
10. Construction of the instrument – Shahanai.
11. Treatment of tala in the krities of Syamasastri – a brief sketch.
12. Kshetra krities of Irayimman Thampi.
13. Instruments used in temple music.
14. Tiruppugazh.
15. Tanavarna.
16. Explain any four symbols used to notate South Indian music.

SECTION – C

1. What are the different mela systems propounded by the Lakshanakaras ?
2. Explain in detail the study of the different periods of musical history with their distinctive features and landmarks in ancient and modern periods.
3. Write an essay on music and geography.

FACULTY OF LAW

21. Law

SECTION – B

1. Plea bargaining.
2. Human rights dimensions of Intellectual Property Rights.
3. Equal protection of laws.
4. Right to clean environment.
5. Mistake of law.
6. Vicarious liability.
7. Interpretation of penal statutes.
8. Crimes against humanity.
9. Legitimate expectation.
10. American Realism.
11. Feminist jurisprudence.
12. Discretionary powers of Governor.
13. Mens rea in statutory offences.
14. Primary education as a fundamental right.
15. Right to development.
16. Electronic evidence.

SECTION – C

1. Explain the concept of equal justice and free legal aid enshrined in the Constitution. What are the legal and other measures adopted in India for the realization of this right ?
2. Critically evaluate the activist role played by the Supreme Court in protecting environment.
3. Explain the concept of human rights of the accused. To what extent scientific evidence adversely affect this right ? Give your answer with special reference to narco analysis.

FACULTY OF MEDICINE

22. Basic Medical Science

SECTION – B

(Draw diagrams **wherever** necessary.)

1. Describe the blood supply and lymph drainage of mammary gland.
2. Explain the femoral canal and its applied importance.
3. Describe the movements of temperomandibular joint.
4. Explain the developmental anomalies of face.
5. Draw and explain the microscopic structure of salivary gland.
6. Describe the structure, blood supply and development of suprarenal gland.
7. Draw and label a diagram of the juxta glomerular apparatus and describe the function.
8. Briefly describe the role of Vit. K in the body.
9. What is the action of acetylcholine on the rate of heart ?
10. Draw a Schematic diagram to outline the cellular mechanisms involved in the HCl secretion by the parietal cells of stomach and explain it.
11. Define ovulation. How are ovulation time and safe period determined ? What is the practical importance of this determination ?
12. What are chemoreceptors ? Tabulate the differences between central and peripheral chemoreceptors.
13. What does it mean that DNA replication is semi conservative ? Discuss.
14. What is RFLP ? How are RFLPs used to identify genes that code for cystic fibrosis.
15. Describe the method you will adopt in fractionating liver tissue into intracellular organelles and indicate marker enzymes for each fraction.
16. Discuss the laboratory findings and biochemical alterations of Gout.
17. What are liver function tests ? Discuss briefly their usefulness in the investigation of jaundice.
18. Outline the metabolism of aromatic amino acids.
19. Explain different routes of drug administration.
20. Describe briefly the adverse drug reaction and its pharmacological basis.
21. Classify the sympathomimetic drugs.

22. Describe the various drugs used in the treatment of Diarrhoea.
23. What are mechanisms of transport of drugs across biological membranes ?
24. Describe the mechanism of drug actions.
25. What are general features of inflammation ? Mention the stimuli for acute inflammation.
26. Describe the pathogenesis and clinical course of Rheumatoid Arthritis.
27. Explain the characteristics of Benign and Malignant tumors.
28. Describe the diseases caused by mutations in enzyme proteins.
29. Describe in detail the tumors of breast.
30. How will you diagnose the genetic diseases ?

SECTION – C

1. Describe the anatomy of the diaphragm. Add a note on diaphragmatic herniae.
2. Mention the movements possible in Hip joint. Describe the origin insertion and nerve supply of any of the muscle proceeding each movement.
3. Describe the visual pathway with the help of diagram. What are the effects of lesion at various levels in the pathway ?
4. Name the gastro intestinal hormones and give a detailed account of their actions.
5. Discuss the absorption, distribution and regulation of calcium and phosphorus in the body.
6. Give an account of radioactive isotopes including measurement of radioactivity, half life period and their clinical application.
7. Define apoptosis. Describe the cause, mechanism and example of apoptosis.
8. Define ‘anaemia’. Classify and specify the features of inherited anaemias.
9. What are aminoglycosides ? Describe the common properties of aminoglycosides and mechanism of action. Add a note on the use and adverse effect of these drugs.
10. Define a receptor. What are the functions of receptors and theories of drug receptor interaction ? How is the receptor regulation occurring ?

23. Medicine and Allied Specialities

SECTION – B

1. Schizophrenia
2. Carcinoma cervix
3. Turners Syndrome
4. Alcoholism-health hazards
5. Obsessive Compulsive Disorder
6. Immunosuppressants
7. Renal Replacement Therapy
8. Carcinoma breast
9. Ring enhancing lesions of brain
10. Randomised control trials
11. Chorionic villus biopsy
12. Meconium Aspiration syndrome
13. Protein Energy Malnutrition
14. Floppy infant Syndrome
15. Dots plus
16. Occupational Diseases
17. HAART
18. Tumor markers
19. Varicose veins
20. Smoking cessation programme
21. Chimerism

22. Total Parenteral Nutrition
23. Nuclear Medicine in Thyroid disease
24. Familial cancers
25. Phobias
26. Newer antipsychotics
27. Renal stones
28. Ebstein Barr Virus
29. Cancer chemotheraphy for multiple myeloma
30. Monoclonal antibodies
31. Swine Flu
32. Inturssusception
33. Polycystic Ovarian Disease
34. Acute Mesenteric Ischemia
35. Acute Flaccid Paralysis
36. Post Partum Psychosis
37. Carcinima tongue
38. Immunization Programme
39. Vitamin D $\rightarrow$ in health and disease
40. X-ray findings in Mitral Stenosis
41. Magnetic Resonance Imaging
42. Kawasaki disease

SECTION – C

1. Design a research project for descriptive study of psychiatric illness prevalent among the school going children in Kerala.
2. Design a research project for a prospective study of Ca. lung using CT chest in smokers in a Panchayat area.
3. Discuss impact of health due to overwork and stress related illness among technopark employees.
4. Design a research project to study the attitude of Government doctors on the ban of private practice.
5. Discuss in detail the supportive therapy, community and home based care and specific therapy of a man with HIV.
6. Design a research project to study the prevalence of dementia in a city.
7. Design a research project to study the pattern and prevalence of short duration fever in a community.
8. Discuss in detail the supportive therapy and care of child admitted with quardriparesis.
9. Design a reaearch project to study the prevalence and prognosis of osteoporosis in geriatric population.
10. Design a research project to study the increased suicidal tendencies among youth in Kerala.
11. Discuss in detail the supportive therapy and nursing care of a patient admitted in a comatosed state.
12. Design a reaearch project comparing the prevalence of cervical spondylosis among head load workers by CT Spine and X ray spine in a Panchayat.
13. Design a research project to study a prevalence of cancer of breast in females in a community.
14. Design a research project for a descriptive study of different causes of heamatemesis getting admitted to a tertiary care hospital.

24. Surgery and Allied Specialities

SECTION – B

1. Choledochal cyst
2. Intussusception
3. Laparoscopy
4. Appendix mass
5. Cystic hygroma
6. Fourniers gangrene
7. Varicocele
8. Tetany
9. Mammography
10. Phaeochromocytoma
11. Enterocutaneous fistula
12. Pneumothorax
13. CTEV
14. Cubital tunnel syndrome
15. Foot drop
16. Pathological fracture
17. Osteogenic sarcoma
18. Anterior dislocation of shoulder
19. Aphakia
20. Corneal ulcer
21. Trachoma
22. Optic Neuritis
23. Dacryocystitis
24. Retinal detachment

SECTION – C

1. Discuss the clinical features and management of acute cholecystitis.
2. Treatment of Early carcinoma of breast.
3. Discuss the treatment of cataract.
4. Discuss the aetiology and management of unilateral proptosis of eye.
5. Discuss the management of acute osteomyelitis.
6. Treatment of spinal injuries.

25. Pharmaceutical Science

SECTION – B

1. Therapeutic drug monitoring.
2. Salient features of Indian Patent Act.
3. Validation of equipment and procedures
4. Ion channel linked receptors.
5. Genetic polymorphism.
6. Leukotrienes and thromboxanes.
7. Cancer vaccines.
8. Applications of nanotechnology in pharmacy.
9. Immobilized plant cell culture.
10. Angiotensin II receptor antagonists.
11. Optical activity and chirality.
12. Insulin drug delivery systems.
13. Aseptic process validation.
14. Patch clamp technique.
15. Fluorescent immuno assay.
16. Reverse phase HPLC and its applications.

SECTION – C

1. Discuss the methods and importance of pharmacoepidemiological studies.
2. Discuss the pathophysiology of inflammation.
3. Discuss with examples the *in silico* methods in drug design.

26. Nursing

SECTION – B

1. Universal precautions.
2. Research hypothesis.
3. Evidence based nursing practice.
4. Polycystic ovarian syndrome.
5. International classification of Disease.
6. Child abuse.
7. Forensic Psychiatry.
8. Control of hospital acquired infections.
9. Therapeutic communication.
10. Acute coronary syndrome.
11. Standards of professional nursing practice.
12. Role of ethics in nursing practice.
13. Neonatal resuscitation.
14. Randomised control trial.
15. Vital statistics.
16. Chain of infection.

SECTION – C

1. a) What is a tool ?
   b) Which are the steps in the development of an instrument ?
   c) Discuss the tool standardisation techniques.
   d) Enumerate the methods of data collection.

2. a) List the phases in research process.
   b) Discuss the purpose of review literature.
   c) Enumerate the steps in preparing a written review.

3. a) What is a research problem ?
   b) Discuss the factors to be considered in selecting a research problem.
   c) Prepare a research proposal related to the topic of your interest and mention the steps you will adopt for submitting to a funding agency.

FACULTY OF DENTISTRY

27. Dentistry

SECTION – B

1. What are the bony boundaries of superior orbital fissure ? Name structures passing through it.
2. Describe various stages of tooth development.
3. Classify anti-anginal drugs. Describe mechanism of action of nitrates.
4. Define shock. Different types of shock.
5. Classify and discuss hypersensitivity reactions.
6. Burning mouth syndrome.
7. Biocompatibility of implants.
8. Antibacterial properties of Saliva.
9. Manifestations of pterygomandibular space infection.
10. Major landmarks on lateral cephalometric tracing.
11. Normal chronological development of deciduous teeth.
12. Materials for maxillofacial prosthetics.
13. Classification of dental ceramics.
14. Define Epidemiology. What are the principles of Epidemiology ?
15. Describe the steps in a descriptive study.

16. Classify the connective tissue. Describe different types of ossification.
17. Biomimetic dental materials.
18. Simplified Oral Hygiene Index.
19. Benign non-odontogenic tumors.
20. Minimally invasive surgery.
21. Antiviral drugs.
22. Lasers in Dentistry.
23. Electro surgery in Dentistry.
24. Monitoring efficiency of sterilization.
25. Techniques of recording the posterior palatal seal.
26. Biofilm.
27. Interleukins.
28. Conditioned Gingival enlargement.
29. Aggressive Periodontitis.
30. Autoimmunity.

SECTION – C

1. Tissue Engineering and its application in dentistry.
2. Prevention of Cross-Infection.
3. Research methodology.

FACULTY OF MANAGEMENT

28. Management

SECTION – B

1. Group Think
2. Operant Conditioning
3. High Touch Low Tech markets
4. Management by Walking around
5. PCMM
6. Green marketing
7. Quality Audit
8. Non parametric tests
9. Efficiency Vs Effectiveness
10. Spidergram
11. Activity based costing
12. Cluster development
13. Laggards in Diffusion of innovation
14. GST
15. Brand Pyramid
16. Service Delivery.

SECTION – C

1. Elucidate the factors that play an important role in choosing the statistical tools to be applied in a research.
2. What kinds of organizational changes have resulted from increased international competition and how has HRM helped achieve those changes ?
3. Enumerate the factors that play an important role in choosing the sampling technique that is appropriate for research.

29. Tourism

SECTION – B

1. Health Tourism
2. Decentralisation problems
3. Home stays
4. Hot stove rule
5. Perceptual block
6. Five forces model
7. Capital rationing
8. Ergnonomics
9. Viral marketing
10. Transit media
11. Impression management
12. Angels for business planning
13. Tour operators
14. SPSS
15. Research Design
16. Operational ratios.

SECTION – C

1. A researcher who wants to learn the cross cultural aspects in Tourism wishes to enroll at University of Kerala. He has to submit a research synopsis on the same. Advice the candidate with a write up on the synopsis.
2. Prepare a questionnaire for a study relating to the establishment of a retail tourism in Kerala.
3. Explain the relevance of integrated marketing communication with examples in the Indian context.

FACULTY OF ORIENTAL STUDIES
30. ARABIC

SECTION– B

١) اللغات السامية
٢) مميزات الشعر الجاهلى
٣) القرآن الكريم
٤) كعب بن زهير
٥) الخطابة فى العصر الجاهلى
٦) نشأة الخط فى بلاد العرب
٧) الشعراء الاسلاميون
٨) الجاحظ
٩) ابو عبد الله محمد بن اسماعيل البخارى
١٠) ابو نواس
١١) الغزالى
١٢) العقد الفريد
١٣) ابو الحسن على الندوى
١٤) السيخ زين الدين المخدوم
١٥) ابن قتيبة
١٦) محمد مندور .

SECTION– C

١) قصّة القصيرة فى الادب العر بى الحديث
٢) العصبة الاندلسية
٣) نجيب محفوظ.

31. Linguistics

SECTION – B

1. What is meant by air stream mechanism ?
2. Describe Immediate Constituent analysis.
3. Give an account of various types of affixes.
4. What is mutual intelligibility ?
5. Distinguish between deep structure and surface structure.
6. What is restricted elaborated code ?
7. Explain the case system in your mother tongue.
8. What is meant by language learning and language acquisition ?
9. Explain the role of culture in translation.
10. Discuss the contribution of Caldwell in comparative Dravidian.
11. What are the components of Generative Grammar ?
12. Describe the typological classification of languages .
13. Explain the different types of meaning with examples.
14. Distinguish between synchronic and diachronic.
15. Explain the relationship between morph, allomorph and morpheme.
16. Write briefly on lexical interference.

SECTION – C

1. What are the causes of dialect variation ? Explain with examples.
2. Explain the mechanism of sound change with examples.
3. Explain the various branches of Linguistics.

32. Hindi

SECTION – B

1. हिन्दी के रासो काव्य।
2. कबीर–कविता की प्रासंगिकता।
3. रीतिकाव्य की उपलब्धियाँ।
4. हिन्दी की प्रगतिवादी कविता।
5. भारतेन्दु के नाटकों में राष्ट्रीय चेतना।
6. नाट्यानुवाद की समस्याएँ।
7. पारिभाषिक शब्दावली।
8. हिन्दी कविता पर वैश्वीकरण का प्रभाव।
9. निराला–काव्य में अभिव्यक्त आत्मसंघर्ष।
10. रस निष्पत्ति संबन्धी विविध वाद।
11. लाँजाइनस का औदात्य सिद्धांत।
12. केरल की हिन्दी पत्रकारिता।
13. जनवादी नाटक।
14. 'ब्रह्मराक्षस' कविता में फंतासी की योजना।
15. रामविलास शर्मा की आलोचना – दृष्टि।
16. समकालीन हिन्दी उपन्यास और महिला लेखन।

SECTION – C

1. समकालीन हिन्दी कविता की प्रमुख प्रवृत्तियों का विश्लेषण कीजिए।
2. हिन्दी उपन्यास क्षेत्र में साठोत्तर काल में आयी नूतन प्रवृत्तियों का विवेचन कीजिए।
3. नाट्य शिल्प तथा रंगमंच की दृष्टि से स्वातंत्र्योत्तर हिन्दी नाटक क्षेत्र में आये बदलावों का समीक्षात्मक मूल्यांकन कीजिए।

33. Malayalam

SECTION – B

1. yTÎq|R¾"Or]^Oç SNWLS^pORa WLuV\ÕLRaÍV ?
2. Ws ^}v]fU fRÐ IÐfO RWL°V oLqL¡ A¡ÀoL"]pRfÍV ?
3. wËq"OrOÕV v]o¡w]"RÕaOÐO IÐ WQf]p]Rs vLhoOXRoÍV ?
4. CqOkLfLU jPãL°V IÐ WQf]RàLqO j]qPkeRouOfOW.
5. WOa]RpLu]"¤ IÐ WQf]p]Rs yUZ¡x¾]R£ fs°¥ AkNYg]"OW.
6. ospLt R\rOWgp]Rs hs]hV AvòpORa Bv]ëLq°¥ ASj~x]"OW.
7. yUØQfvQ¾°tOU nLxLvQ¾°tOU fÚ]sOç v|f|LyRoÍV ?
8. fLqfo|yLz]f|U IRÍÐV v]whoL"OW.
9. wLyjnLxRp"Or]^Oç v|f|ñLn]NkLp°¥ NWLc}Wq]"OW.
10. i~j]y]ÈLR¾ kq]\pRÕaO¾OW.
11. IÍLeV j]SpLWõLy]y]yU ?
12. AjOWqeR¾"Or]^V S†SãLpOU Aq]SðLŸ]sOU krpOÐRfÍV ?
13. qLoLpeWg Aa]òLjoL"]p y].I¢.è}WeVb¢ jLpqORa jLaW°¥ Jv ?
14. nLxpOU nLxLSnhvOU fÚ]sOç v|f|LyRoÍV ?
15. AµOv¹U, oe]NYLoU & CvRp "Or]^V WOr]ÕOWRtuOfOW.
16. CÎOSsXàO oOÒO°Lp ospLt SjLv¤ yUqUn°¥ Jv ?

SECTION – C

1. BiOj]WfpORapOU BiOj]SWL¾qWfpORapOU yLÐ]i|U ospLt SjLvsO WtORa kéL¾s¾]¤ kq]SwLi]"OW.
2. oe]NkvLtyLz]f|¾]R£ Rvt]^¾]¤ SWqt¾]R£ yLoPz]WLvòRp j]q}ƒ]"OW.
3. ^Ó]yNÒhLpU. ^Lf]yNÒhLpU, oqOo"¾LpU fOa°]pvRp"Or]^Oç v|f|ñLn]NkLp°¥ \¡^R\áOW.

34. Sanskrit

SECTION – B

II. 1) Astạdhyāyi

2) Yāska

3) Epics

4) Brāhmānās

5) Rasagangādhara

6) Udayanācarya

7) Natạyas'āstra

8) Rājatarangini

9) Pancatantra

10) Sūdraka

11) Rigveda

12) Caraka Saṁhita

13) Raghuvamsa

14) Sūtra Literature

15) Varāhamihira

16) Bhagavadgita.

SECTION – C

III. 1) Origin and development of Sanskrit drama.

2) Sanskrit and computer.

3) Advaita philosophy of Sri Sankara.

35. Tamil

SECTION – B

1. ஆற்றுப்படை இலக்கியம்
2. பல்லவரின் கலைத்திறன்
3. குடவோலை ஆட்சிமுறை
4. சீவகசிந்தாமணி
5. கல்வெட்டுக்கள்
6. அருட்பா – மருட்பா போராட்டம்
7. ஆறுமுகநாவலர்
8. நாட்டுப்புறக் கலைகள்
9. நவீனத்துவம்
10. கரிசல் இலக்கியம்
11. பெண்ளழுத்து
12. தமிழில் கணினி
13. விடுதலைப் போராட்ட இயக்கம்
14. கவிஞர் சுரதா
15. காண்டிகை உரை
16. ஆய்வுச் சிக்கல்

SECTION – C

1. ஆய்வுத் தலைப்பினை ஆய்வாளர் எவ்வாறு தேர்ந்தெடுக்க வேண்டும் ?
2. ஆய்வேட்டின் அமைப்பு, வெளியீட்டு முறைகள், மொழி நடை குறித்து எழுதுக.
3. காலந்தோறும் உருப்பெறும் இலக்கியசொல்நெறிகள் தமிழிலக்கிய ஆய்வுலகில் விளைவிக்கும் வளர்ச்சி நிலைகளை விவரிக்க.

FACULTY OF PHYSICAL EDUCATION

36. Physical Education

SECTION – B

1. How can research in physical education contribute to the improvement of the profession ?
2. How do you define physical education as an academic discipline ?
3. Explain the components that are essential for the development of physical fitness.
4. What is biomechanics ? Explain its role in physical education.
5. What do you mean by inter-disciplinary research ? Explain its scope in physical education.
6. How can physical education contribute to the value development of an individual ?
7. Why are exercise programmes for senior citizens essential in the future ?
8. Explain the importance of yoga in modern living.
9. What are the major features of sports training ?
10. Explain the role of computer in analyzing the results of research.
11. Define descriptive statistics with examples.
12. Explain mean, median and mode.
13. What do you mean by experimental study ?
14. What are the various interview techniques ?
15. Write a short note on sports management.
16. Highlight the importance of community physical fitness programme.

SECTION – C

1. Explain the importance of Test, Measurement and Evaluation in physical education.
2. Elaborate the role of exercise physiology in physical education and sports.
3. Explain the role of prevention and management of injury in sports competitions.

FACULTY OF APPLIED SCIENCE

37. Biotechnology

SECTION – B

1. Write notes on : a) Mitotic spindle b) Pasteurization c) Non competitive inhibition
2. Explain the role of plant tissue culture in secondary metabolite production.
3. Explain different models of plasma membrane.
4. What is PCR ? Explain briefly different types of PCR. Write two applications of PCR.
5. Describe the structural composition of gram positive bacteria. How is it different from that of gram negative bacteria ?
6. What are GMOs ? Add a note on Bt cotton.
7. Define :
   a) Mycoplasma
   b) Archaebacteria
   c) Tyndallization
   d) Bioremediation
8. Differentiate between BOD and COD.
9. What are molecular markers ? Describe the different types of markers used for genome analysis.
10. What is ELISA ? Comment on its significance.
11. Describe lab diagnosis of tuberculosis.
12. Elaborate the different gene transfer techniques in genetic transformation.
13. Write notes on microbial leaching of ores.
14. Direct organogenesis is usually preferred for creating genetically uniform plants rather than callus mediated organogenesis. Why ?

15. Define : a) Drug b) Antibiotics c) Oncogenes d) Vaccine

16. What are endospores ? Describe various stages of sporulation in a bacterium.

17. Explain the significance of genome projects with a suitable example.

18. Write notes on :
    a) AFLP b) HPLC c) SDS PAGE

19. Explain in detail eukaryotic transcription.

20. How are microbial population numbers determined ? Add note on the advantages and disadvantages of the technique.

21. How can you isolate enteric pathogens of medical importance ?

22. Distinguish between :
    a) Repression and feedback inhibition
    b) cDNA library and Genomic library

23. Virulence in bacterial pathogens is increased by capsules. Is this statement true ? Discuss.

24. Explain the process of production of natural and biosynthetic β lactam antibiotics.

SECTION – C

1. Propose a project for research work on the topic "Bioactive screening of antimicrobial compounds from a medicinal plant". Prepare the proposal highlighting the genesis, objectives, methodology and expected outcome.

2. Design a project proposal including objectives, methodology, expected outcome and future prospects on "Isolation and strain improvement of chitinase producing microorganisms".

3. "Cloning and characterization of abiotic stress resistance gene from cowpea". You are directed to work on the above said topic for your Ph.D work. Submit a project proposal for the same highlighting the major objectives, methodology and future prospects.

38. Computer Science

SECTION – B

1. What is the output of the following C program ?

```
int f(int x)
    { x = x – 1 ;
        return (x) ; }
void main( )
  { int x, result ;
      x = 6 ;
     result = f(x) * f(x) ;
     printf("%d", result) ; }
```

2. Find the most appropriate logical formula to represent the statement :

   "Gold and silver ornaments are precious"

   The following notations may be used :

   G(x) : x is a gold ornament.

   S(x) : x is a silver ornament.

   P(x) : x is precious

3. Write an algorithm to convert NFA to DFA. Show an example.
4. Translate the expression x * (y – z) * p/q – m into
   a) syntax tree
   b) postfix notation
   c) three address code
5. What is meant by memory segmentation ? Describe.
6. Discuss two methods for creating and running a thread in JAVA.
7. Explain the following instructions in intel 8085.
   a) DDA b) DAD H c) XCHG d) RAL
8. Explain a Perceptron classifier in artificial neural networks.

9. Consider a disk system with 100 cylinders. The request to access the cylinders occur in the following sequence :

   4, 34, 10, 7, 19, 73, 2, 15, 6, 20

   Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1 ms to move from one cylinder to adjacent one and shortest seek time first policy is used ?

10. Five items P, Q, R, S and T are pushed into a stack in the order given one at a time. The stack is popped four times and each element is inserted in a queue. Then two elements are deleted from the queue and pushed back into the stack one at a time. Now one item is popped from the stack. Which is that item ?

11. A computer on a 10Mbps network is regulated by a token bucket which is filled at a rate of 2Mbps. The bucket is initially filled with 24 megabits. What is the maximum duration for which the computer can transmit at the full 10Mbps ?

12. The hash function, **hash = key MOD size** and linear probing are used to insert the keys, 37, 38, 72, 48, 98, 11, 56 into the hash table with indices 0...6. Find the order of the keys in the array.

13. An operating system uses a Least Recently Used (LRU) page replacement algorithm for managing virtual memory. Consider the following page reference string where each reference is made in one unit of time :

    1, 8, 1, 7, 8, 2, 7, 2, 3, 1, 3, 8, 2, 1, 3, 1, 7, 1, 3, 7

    If this process has been allocated 4 page frames, what is the number of page faults occurring ?

14. Write regular expression for variable names in C Language and convert the regular expression to context free grammar.

15. Describe the three-layer Client-Server architecture.

16. Describe IEEE 802.5 LAN standard.

SECTION – C

1. Discuss the issues in implementing distributed databases. How are they handled in the World Wide Web ?

2. What is meant by Data Mining ? Discuss the current techniques used and potential research issues in Data Mining.

3. Discuss a research problem of your choice in the field of Computer Science and directions for tackling it.

39. Environmental Science

SECTION – B

1. Stratospheric Ozone.
2. Air quality monitoring.
3. GIS and Remote Sensing in Environment management.
4. Seaweeds
5. Cost-Benefit Analysis.
6. Biocoenosis
7. What is EEZ ?
8. Biomagnification and Bioaccumulation.
9. What are land polluters ? Explain.
10. Meteorology
11. Significance of DO in water quality.
12. Acid rain
13. Sewage Pollution.
14. Artificial fertilizers and Pesticides, explain.
15. Explain water quality parameters.
16. Ionising and non-ionising radiations.

SECTION – C

1. What are environmental pollutants ? Describe various pollutants of air, water and land.
2. Write an essay on composting and vermicomposting.
3. Write an essay on different types of waste-management and give your ideas on most desirable methods in Kerala.

40. Opto Electronics

SECTION – B

1. Briefly explain the concept of coherence.
2. What is a quarter wave plate ?
3. What are the conditions for getting second harmonic generation in a crystal ?
4. Give note on aerosols.
5. What is a quantum dot ?
6. What is optic axis of a crystal ?
7. Distinguish between TDM and WDM.
8. Give notes on an erbium doped fiber amplifier.
9. Give the electromagnetic spectrum in the descending order of frequency.
10. Explain the three transmission windows in a silica fiber in optical communication.
11. Distinguish between interference and beats.
12. Distinguish between indirect and direct band gap materials.
13. Discuss the different methods of achieving population inversion in lasers.
14. What is electro-optic effect ?
15. Give note on compound semiconductor. Give a few examples.
16. What do you mean by spatial filtering ?

SECTION – C

1. a) Describe different types of optical fibers. Explain how light is propagated through a fiber.
   b) Briefly explain the different signal dispersion mechanisms in a fiber.
   c) Define numerical aperture of a fiber. The typical relative refractive index difference of an optical fiber is 1%. Estimate the numerical aperture and solid acceptance angle in air for the fiber when the core index is 1.46. Calculate critical angle of the core-cladding interface with the fiber.
2. a) Write down the principle of a laser. Distinguish between stimulated emission and spontaneous emission.
   b) Discuss the working of a three level laser.
3. a) What is the principle of holography ? Mention its advantages over conventional photography.
   b) Explain how holograms are recorded and images are reconstructed.

41. Technology Management

SECTION – B

1. Give a brief account of technology forecasting.
2. Make a comparison of Gompertz and Pearl curves.
3. Give the advantages and disadvantages of Morphological analysis as a technology forecasting method.
4. Give an account of bio informatics.
5. Develop a note on value chain analysis.
6. Make an assessment of developing optical fiber technology in India.
7. Give an account of prospects of nano technology in the context of India.
8. Critically evaluate the ongoing space research in India.
9. Distinguish process and product life cycles in terms of the lags.
10. Explain the dimensions of Technology Information Systems.
11. Develop a note on technology assessment.
12. Explain what do you mean by Adaptive Estimation Procedure (AEP).
13. Conceptualize Genetic Algorithm.
14. Develop a note on evolutionary computing.
15. Give a brief account of measuring chaos.
16. Conceptualize and highlight the importance of developing early warning systems.

SECTION – C

1. Discuss the importance of fuzzy logic in technology development.
2. Develop a note on technological implications of globalization in the developing context of India.
3. Give an account of knowledge engineering.

FACULTY OF SCIENCE

42. Aquatic Biology and Fisheries

SECTION – B

1. Crustacean capture fisheries of India.
2. Explain the operation of bottom trawl net and purse seines.
3. Artemia: an ideal live feed for aquaculture.
4. Importance of mangrove ecosystems.
5. Estuary : definition and types.
6. Traditional shrimp farming in Kerala.
7. Compare lotic and lentic ecosystems.
8. Status of brackish water fin fish aquaculture in India.
9. India is considered as a sleeping giant in ornamental fish trade, comment on.
10. Seed production of *Macrobrachium rosenbergii*.
11. Methods for management of aquatic resources.
12. Molecular diagnostic techniques used for detection of fish and shell fish diseases.
13. White spot syndrome virus (WSSV).
14. Indian oil sardine fishery of Kerala coast.
15. Selective breeding in aquaculture.
16. Productivity of Indian reservoirs.

SECTION – C

1. Explain primary productivity and the factors influencing it.
2. India is a carp country, explain.
3. Semi intensive shrimp farming in India.

43. Biochemistry

SECTION – B

1. What are ribozymes ? Explain their characteristic activities.
2. What are Telomeres ? What are their characteristics ? How are they synthesized ?
3. Briefly describe how X-ray diffraction technique has been employed to elucidate the structure function relation of ribosomes.
4. Dietary deficiency of vitamin B_1 leads to the disease beriberi. This is characterized by increased levels of pyruvate and alpha ketoglutarate in the blood. How does vitamin B_1 deficiency account for this?
5. Explain why familial hypercholesterolemia results in elevated levels of blood cholesterol.
6. How is nitric oxide formed ? How does it control vasodilation ?
7. Generally, plants have no need to produce urea; yet they contain almost all the enzymes of Urea cycle. Explain why ?
8. The amino acid sequence of a segment of a protein is-Met-Lys-Tyr-Ala-Asn-Gly-Ser-Val-Ser-Thr-Cys-Gly-. What are the possible post translational modifications that can occur in this segment of the protein and explain how it can occur ?
9. Illustrate with examples the feedback regulation of enzymes.
10. Explain the molecular mechanism of the hypoglycemic effect of Insulin.
11. Indicate the multiple pathways by which glucose-6- phosphate is metabolized and explain how the relative levels of ATP and AMP influence this.
12. Describe the flow of electrons in the mitochondrial electron transport chain and explain how it is coupled to ATP formation.
13. Explain the biochemical basis of I-cell disease.
14. What are proteoglycans ? Explain the structural features of chondroitin sulphate proteoglycan of the cartilage.
15. Explain how PCR technique is employed to study gene expression.
16. Explain the role of cyclins in cell cycle regulation.

SECTION – C

1. A new protein has been identified. It appears to modulate the expression of a number of genes. Design a study to test this hypothesis.
2. An enzyme X_2Y_2 that catalyses the reaction $A + B \rightleftarrows C + D$, appears to be subject to allosteric regulation by a ligand L. Design an experiment to carryout kinetic analysis to demonstrate the allosteric property of the enzyme and to test the effect of the ligand.
3. What are monoclonal antibodies ? Explain how monoclonal antibodies are produced. Indicate their clinical applications.

44. Botany

SECTION – B

1. Describe the process of transcription in prokaryotic organisms.
2. Describe the ultrastructure and functions of the chloroplasts.
3. What are the different systems of classification ? Discuss the merits and demerits of Bentham and Hooker's System.
4. Write the botanical name, family, salient features and useful plant part of any five drug yielding plants.
5. Write short notes on the different types of vectors used in genetic engineering.
6. What are giant chromosomes ? Discuss the significance of polytene chromosomes in the preparation of cytological maps.
7. Gymnosperms form an intermediate group between the higher cryptogams and angiosperms. Highlight the resemblances and differences between the groups.
8. What are genetically modified organisms ? Give your opinion on the advantages and disadvantages of GMOs.
9. Differentiate between oncogenes and tumour suppressor genes.
10. Describe the structure of the DNA double helix.
11. Explain the 'ecosystem concept'.
12. How does the 'Theory of endosymbiosis' explain the evolutionary relationship between the cyanobacteria and eukaryotes ?

13. What are transposable genetic elements ? How does the process of transposition take place ?

14. Describe the inheritance of characters in a dihybrid cross with a suitable example. How is the phenotypic ratio modified in case of complementary gene action ?

15. What are the symptoms exhibited by Down's syndrome victims ? Explain the chromosomal anomaly responsible for the syndrome.

16. What are the salient features of the family Asteraceae ? With the help of diagrams, describe the floral parts of any one plant belonging to the family.

SECTION – C

1. You have completed the chemical profiling of different populations of a particular plant species. One of the populations shows increased levels of the compound of your interest. What are the further steps you will adopt ?

2. A toxic principle in an otherwise important vegetable acts as a deterrent in its wide use. How will you check the activity of the gene/genes involved in the metabolic pathway synthesizing the compound ?

3. While on a plant collection trip to a mountainous terrain you come across a population of wild rice, which is different from the samples you have observed so far in terms of the morphological features. What will you do with collected plant material.

45. Chemistry

SECTION – B

1. What is Jahn-Teller distortion ? Discuss its spectral consequences.

2. The electron pairing energy of Cr^{3+} ion is 250 kJmol^{-1}. Δ_0 value for the complex $[Co(NH_3)_6]^{3+}$ is 275 kJmol^{-1}. Comment on the magnetic property of this complex. Also calculate its LFSE.

3. Compare the electronic spectra of lanthanide complex with those of 3d metal complexes.

4. Discuss the role of a co-catalyst in Wacker's process.

5. The DTA curve of $CaC_2O_4.H_2O$ shows an exothermic peak in oxygen atmosphere, but not in nitrogen atmosphere. Why ? Mention the various factors that affect thermogravimetric curves.

6. Explain the basis of designing "synthetic blood". Discuss the functions and limitations of this model.

7. Write equations describing the flux transport (transfer) process in irreversible thermodynamics.

8. Critically discuss the significant features of any binary solid systems of technological importance.

9. Bring out the merits and demerits of the theory of collision and theory of absolute reaction rate.

10. Show that C_{3v} point group contains any three classes even though the order of the group is six.

11. How is amperometric methods applied to quantitative analysis ?

12. Outline how the number average and weight average molecular weight of polymers can be determined.

13. Describe with examples the neighbouring group participation by (a) sigma bonds, (b) pi bonds and (c) aryl rings.

14. Write the mechanism of the formation of 3-anisidine in the reaction of 2-bromoanisole with $NaNH_2$-liq.NH_3 and explain why no 2- anisidine is formed.

15. Write the mechanism of (a) Photo-Fries rearrangement, (b) Patterno-Buchi reaction, (c) Di-pi-methane rearrangement.

16. Establish the structure of the compound that has the following spectral data IR : (KBr) 1704, 814 cm^{-1}; NMR δ:2.12, s, 3H; 3.84, s, 2H; 7.45-7.68, dd, 4H; MS : m/z [M+2], 214, [M^+], 212, 199, 197, 171, 169, 133, 43.

SECTION – C

1. a) Write a brief account of the photochemical reactions of transition metal complexes.

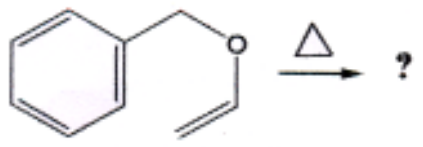
   b) How is $(PNCl_2)_3$ prepared ? Discuss its structure and bonding.

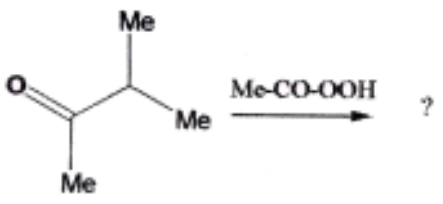
2. a) Explain the use of Fourier synthesis in crystal structure determination.

   b) Draw the potential energy surface contour map for the reaction

   $$H_a + H_bH_c \rightarrow H_aH_b + H_c$$

3. Identify the product in the following thermal reactions. Write the mechanism of each.

   a) 

   b) 

46. Demography

SECTION – B

1. Views of Malthus on population.
2. Demographic consequences of economic development.
3. Sample Registration Systems (SRS) of India.
4. Present health scenario of Kerala.
5. How to construct an age pyramid ?
6. Role of media in Population Education.
7. Role of Information Technology in Demographics.
8. Brass P/F ratio method.
9. Define population policy. Explain the different types of Population Policies.
10. National Family Health Survey (NFHS) of India.
11. Different measures of fertility.
12. Direct and Indirect demographic effects of International Migration.
13. Parametric and Non-parametric sampling.
14. Cohort Component method of population projections.
15. Different types of environmental pollution.
16. Manpower Planning in India.

SECTION – C

1. What do you understand by 'Ageing of Population' ? Prepare a research proposal for studying the socio-economic problems faced by the aged widows in Kerala.
2. Define Life Table. Explain the relations of different columns of an abridged life table by describing the usual notations and the method of calculating them.
3. Critically evaluate the Family welfare Programmes of India.

47. Geography

SECTION – B

1. Write a note on centripetal forces on urban development.
2. Compare and contrast the Himalayan rivers with the Peninsular rivers.
3. Explain the parametric approach of land classification.
4. Write the significance of systems approach in geography.
5. Explain with suitable illustrations, the mode of construction and properties of sinusoidal projections.
6. Bring the salient features of Polar Front Theory.
7. Discuss the process of map compilation.
8. Discuss the least cost theory of industrial location.
9. Examine the applicability of Von Thunen's Agricultural Land Use Theory in the present World.
10. Distinguish between crop concentration and crop diversification.
11. Bring the salient features of continental drift hypothesis.
12. Write a short note on rank-size rule.
13. Discuss the processes contributing to the global warming.
14. Explain the importance of geomorphological applications in engineering works.
15. Write a short note on 'geomatics'.
16. Discuss the elements of aerial photo interpretation.

SECTION – C

1. Discuss the characteristics of Indian monsoon and its significance on the agricultural economy of India.
2. Explain how you will assess the environmental degradation and its socio-economic implications in the rural-urban fringe of a city.
3. Mention the significance of watershed development planning and discuss the methodology for the preparation of a watershed development plan.

48. Geology

SECTION – B

1. Define facies in sedimentary basin analysis. What is its significance in sequence stratigraphy.
2. What is meant by spectral reflectance ? How it is used in remote sensing studies ?
3. What is moranes ? Add a note on its formation and types.
4. Write note on carbon compensation depth.
5. What is arkose ? Write note on its formation.
6. Describe briefly on the important fluvial depositional features.
7. Define isomorphism and polymorphism and give few examples of each.
8. Compare and contrast fore-arc basin and retro-arc basins.
9. Explain morphogenetic region.
10. Explain stress and strain ellipsoid and their uses in study of faults.
11. What are the recent methods in earth quake prediction ?
12. Compare and contrast stable and unstable isotopes, write note on their application in Geology.
13. Write note on ultra-high temperature.
14. Explain geothermobarometry.
15. What is meant by ring complexes ? Explain.
16. Explain seawater intrusion.

SECTION – C

1. Give an account of the important variation diagrams and explain their utility in deciphering igneous suites.
2. Write an essay on the types, sources and process of heavy mineral accumulation along Kerala coast.
3. State and explain Darcy's law and give its experimental verification and validity.

49. Home Science

SECTION – B

1. Name the organs that secrete digestive juices. How do the juices and enzymes facilitate digestion ?
2. Explain the protein sparing action of carbohydrates.
3. What does the term 'Omega' mean with respect to fatty acids in disease prevention ?
4. Outline the components of the National Programme for the prevention of anaemia among pregnant women.
5. Discuss the biochemical changes leading to blindness with Vitamin A deficiency.
6. Define obesity and explain the anthropometric parametres used in diagnostic studies.
7. What is a work curve ? State its application to time management.
8. Write briefly on socio-drama.
9. Elaborate on the role conflicts of working women with young children.
10. What is meant by environmental protection ? How can you as a Home Scientist help families to protect their near environment ?
11. Explain the hazards of noise pollution.
12. What is meant by consumer equilibrium ?
13. Explain the procedure for estimating the energy cost of a work.
14. Differentiate between guidance and counselling.
15. Critically examine the suitability of electronic media for extension teaching in your locality.
16. Define empowerment and enumerate the indicators of women's empowerment.
17. Depict programme development cycle and explain its utility.
18. What is Ergonomics ? State the scope of research in this area.

19. Enumerate the qualities of a good entrepreneur. Mention a scheme appropriate to you to venture into this field.

20. What are the fuel saving techniques recommended for popularisation at household level ?

21. Enumerate the techniques for effective space utility in the kitchen.

22. Enumerate the handicaps of illiteracy. Mention the schemes in operation in your area for eradication of illiteracy and /or imparting functional literacy.

23. Define gender and enumerate the gender inequalities still prevalent in our society and their ill effects.

24. Women's inclusion in Panchayat Raj Administration has raised their status in the society – substantiate your view.

SECTION – C

Choose **any one** of the areas listed below and prepare a research proposal stating clearly:

a) The problem

b) The need and significance of the study.

c) The objectives of the study and hypothesis if any.

d) Methodology to be followed.

e) The analysis that would be adopted.

1) Nutritional Empowerment of Self Help group (Kudumbashri) members.

2) Occupational status of women in the unorganized sector.

3) Development of literacy training module for neoliterates for imparting Life-oriented education.

4) Problems in the adoption of solar devices.

50. Mathematics

SECTION – B

1. Find all automorphism of the field $Q(\sqrt{2}, \sqrt{3})$ where Q is the field of rationals.
2. Find the order of the element (2, 3) in the group $Z_{12} \oplus Z_8$.
3. Verify whether the matrix A given below is diagonalizable.

$$A = \begin{pmatrix} 5 & -6 & -6 \\ -1 & 4 & 2 \\ 3 & -6 & -4 \end{pmatrix}$$

4. Let V be the linear space of all polynomials in one variable. Show that there exist non-trivial sub spaces W_1 and W_2 of V such that $V = W_1 \oplus W_2$.
5. Let $\mathbb{R}$ be the set of real numbers with usual topology. Find the closure of the following subsets of $\mathbb{R}$.
   i) $\left\{\frac{1}{n} : n = 1, 2, \ldots\ldots\right\}$
   ii) $\left\{\frac{m}{n} : m = 0, 1, \ldots, n; n = 1, 2, \ldots\right\}$
   iii) Rationals in $\mathbb{R}$.
6. For n = 1, 2, ... and x in [0, ∞), let $f_n(x) = x^2 (1+x^2)^{-n}$. Verify whether the series $\sum_n f_n(x)$ converges for each x in [0, ∞). Is this series uniformly convergent on [0, ∞). Justify your answer.
7. Let X be a topological space and A, a subject of X. Show that $\overline{A}$, the closure of A, is the disjoint union of the interior of A and the boundary of A.
8. State Tietze's extension theorem and Urysohn's lemma. Prove that both are equivalent statements.
9. Show that every countable subset of $\mathbb{R}$ has Lebesgues measure zero. Verify, by an example, that the converse is not true.

10. Let C be the positively oriented circle { z : |z – 1| = 2. Evaluate $\int_c \frac{e^z}{z(z-2)} dz$

11. Factor $x^4 + x^3 + x + 3$ completely over Z_5 [x]

12. Prove that a continuous map from R to $\mathbb{R}$ which takes open sets to open sets must be monotonic.

13. If a is any poistive integers show that $(a^m - 1, a^n - 1) = a^{(m,n)} - 1$

    (Here (m, n) stands for the g.c.d. of m and n)

14. Let X be a Banach space and let $x_0 \in X$, $x_0 \neq 0$. Prove that there is a continuous functional f on X such that $f(x_0) = 1$.

15. Let H be a Hilbert space. Prove that if x, y ∈ H and x, y both non-zoro, then

    $\|x + y\| = \|x\| + \|y\|$ if and only if y = αx for a suitable $\alpha > 0$.

16. Let A be a Banach algebra and x ∈ A. Define $\sigma(x)$, the spectrum of x. Determine $\sigma(0)$. If x, y ∈ A, show that $\sigma(xy)$ and $\sigma(yx)$ differ atmost by {0}.

SECTION – C

1. Develop the theory of Lebesgue integration starting from the Lebesgue integral of a simple function. Also establish the connection between the Lebesgue integral and the Riemann integral.

2. Discuss ‘Connectedness’ in topological spaces. Establish the properties of connected sets. Characterize the connected subsets of $\mathbb{R}$, the set of reals with usual topology.

3. Describe the construction of the field of quotients of an integral domain. Show that this field is the smallest field containing the given integral domain as subdomain.

51. Physics

SECTION – B

1. Derive Euler's equations of motion and explain its significance.
2. Explain the concept of streamlines and velocity potential.
3. What is coherence in light ? Explain spatial and temporal coherence in detail.
4. What are the most significant similarities between the Bohr model of Hydrogen atom and the Schrodinger analysis ? What are the differences ?
5. a) What is the difference between an oscillator and an amplifier ?
   b) What is an operational amplifier ? Draw a simple low pass filter circuit using an operational amplifier and explain its functions.
6. What is Coriolis force ? Derive equations of motion in a rotating frame of reference.
7. a) Discuss the motion of a charged particle in a uniform electric and magnetic field.
   b) An electron moving with a velocity of 1000 Km/sec enters an uniform magnetic field at an angle of 45° with it. Calculate the magnetic flux density required inorder that the radius of path is 100 cm. Also calculate time taken by the electron for one revolution.
8. a) Define Plasma.
   b) What are the adiabatic invariants ?
   c) What is mirror effect ? Name a practical application of this effect.
9. Explain in detail the uncertainty principle. What are its implications ?
10. a) Explain Doppler effect. Is there any difference between this effect observed for sound waves and light waves ? If so why ?
    b) An ultraviolet line from a Galaxy for a singly ionised calcium of wave length 390 nm is observed at 410 nm. Calculate the speed of recession of galaxy from the earth.
11. a) What is a dipole antenna ? Describe its gain and directivity.
    b) Derive an expression for the far field power pattern of a parabolic dish antenna.
12. a) Explain in detail the difference between fission and fusion reactions.
    b) Explain, what is Tunnel effect ?

13. a) What is the electric field 3×10^{-9} m from an alpha particle ?
    b) What is the force on an electron at this distance from an alpha particle ?
    c) An electron and an alpha particle are 2.7×10^{-11} m apart. How much energy must be expended to separate these two charged particles ?

14. a) State Kepler's third law of planetary motion.
    b) A comet has an extremely elongated elliptical orbit. At peri helion its distance from the sun is 9.0×10^{10} m and its peri helion speed is about 5.4×10^{4}m/s. At aphelion its distance is 5.7×10^{12}m. What is the comet's aphelion speed ?

15. a) Explain the term entropy of a system.
    b) Show that when a substance of mass 'm' having a constant specific heat 'c' is heated from T_1 to T_2, the change in entropy is
    $S_2 - S_1 = m\ c\ ln\ \frac{T_2}{T_1}$.
    c) In a specific heat experiment 100 gm of lead (C_P = 0.0345 Cal/gm C^o) at 100^{o}C is mixed with 200 gm of water at 20^{o}C. Find the difference in entropy of the system at the end from its value before mixing.

16. a) What is de Broglie wave ? Derive an expression for de Broglie wave length.
    b) The speed of an electron is 1.2×10^{6} m/s. What is its de Broglie wave length ?

SECTION – C

1. What are the spectroscopic methods available to study the structure of a molecule ? Describe a research plan to study the structure of a gas molecule.
2. What is meant by remote sensing ? Give basic principles of satillite remote sensing.Give a research plan to study the temperature structure of earths atmosphere up to 60 Km using satellite remote sensing.
3. What is a nano material ? What is its importance ? How one can prepare such materials and study the properties ?

52. Statistics

SECTION – B

1. Give two n×n matrices A and P, where P is non singular. Suppose λ is an eigen value of A. Then show that λ is also an eigen value $B = P^{-1} AP$.
2. If $f \geq 0$ is T-measurable and such that $\int f \, d\mu = 0$ then show that f = 0 a.e.
3. Given $\{A_n\}$, a sequence of events such that $\sum_{1=1}^{\infty} (P(A_i) < \infty$. Then determine the value of $P(\limsup A_n)$.
4. Suppose $F_1(x)$ and $F_2(y)$ are two distribution functions with probability density functions $f_1(x)$ and $f_2(y)$ respectively. Then prove or disprove : "$f(x) = F_1(x) f_2(x) + F_2(x) f_1(x)$ is also a probability density function".
5. Suppose X_1 and X_2 are two iid N (0,1) variables. Obtain the distribution of $Y = X_1 / X_2$.
6. For a multivariate normal distribution, show that the linear combination of any subset of component random variables of the given random vector is normally distributed.
7. Obtain the UMVUE of the parameter θ of the uniform distribution over $(0, \theta)$ based on a random sample of size n.
8. Let $X_1, X_2, ..., X_n$ be a random sample of size n drawn from a distribution with pdf.

   $$f(x,\theta) = \frac{1}{2} e^{-|x-\theta|}, \quad -\infty < x < \infty$$

   Obtain the MLE of θ and its asymptotic variance.
9. Derive the MP test for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ based on a random sample of size n drawn from the distribution with pdf.

   $$f(x,\theta) = \begin{cases} \theta(1-\theta)^{x-1}, & x = 0,1,2,... \text{ and } 0<\theta<1 \\ 0 \quad , & \text{otherwise} \end{cases}$$

10. Define a run. Explain how run test is used to test the randomness of a sample. State the large sample distribution of runs.
11. Define confounding in 2^n-experiments. In a 2^4-experiment the principal block of the confounding is {(1), bc, abd, acd}. Then obtain the other blocks and identify the confounded effects. If there are r replications of this confounded design, outline its analysis.

12. Define BIBD. Establish the relation $b \geq V+r-K$. Discuss the efficiency of BIBD relative to RBD.
13. In srswr of three units from a population of N units obtain
    i) The probability that the same unit is selected in the sample.
    ii) The probability that the sample contain two different units.
14. Prove or disprove the following statements on ratio and regression estimates of the population mean $\overline{Y}$.
    i) The ratio estimate of $\overline{Y}$ is biased.
    ii) The regression estimate is generally more efficient than the ratio estimate.
15. Derive the Kolmogorov forward difference equations of M/M/1 queues and derive the stationary probability distribution of this queue.
16. Show that for a Galton - Watson, branching process, the ultimate extinction probability is the smallest non-zero root of the equation $s = \phi(s)$.

SECTION – C

1. Derive the distribution of sample multiple correlation coefficient based on independent observations drawn from a multivariate normal distribution. Hence obtain a test criterion for testing the null hypothesis that the population multiple correlation coefficient is equal to zero.

2. Let $X_1, X_2, ..., X_n$ be a random sample of size n drawn from the uniform distribution over $\left(\theta-\frac{\sigma}{2}, \theta+\frac{\sigma}{2}\right)$. Then obtain
    i) Minimal sufficient statistic for (θ, σ).
    ii) UMVUE of θ and σ and their variances.
    iii) MLE's of θ and σ. Are hey unbiased ?
    iv) MLE of θ when σ is known.

3. i) What is systematic sampling ? How do you estimate the variance of the mean from a single systematic sample ? For populations with a linear trend explain the advantages or disadvantages of systematic sampling when compared to stratified sampling.
    ii) Define BIBD. With usual notation show that for a symmetrical BIBD any two blocks will have λ varieties in common. Derive the inter-block analysis of a BIBD.

53. Zoology

SECTION – B

1. Distinguish between holometabolous and hemimetabolous insect.
2. What is 'unit membrane' concept ?
3. Precisely explain cell theory.
4. Distinguish between niche and habitat.
5. How are ecological 'hot spots' important ?
6. What is the role of interference RNA ?
7. How is mitochondrial DNA important in Phylogenetic analysis ?
8. Briefly explain the principle of PCR.
9. What is a 'knock out' mouse ? How are they important ?
10. What are transgenic plants ?
11. Briefly explain the functional significance of reticular formations of the brain.
12. Compare the physiological role of acetyl choline and adrenaline as neurotransmitters.
13. How does a protein hormone act at the target cell level ?
14. What are melanopsin cells ?
15. What is meant by pluripotency ?
16. What is the evolutionary significance of 'reproductive isolation' ?

SECTION – C

1. Name the hormones of the 'Hypothalamo-Pituitary-Gonadal axis'. Briefly explain the function of each.
2. What is Neo-Darwinism ? Describe the major concepts that are involved in it.
3. Substance 'PS' obtained from a plant is suspected to have some haematological influence.

   State a hypothesis for the above possibility. Design an experiment to verify the hypothesis you have stated ; select 2/3 logical parameters for quantitative data. Comment on the Data summarization, statistical techniques for data analysis and interpretation.

FACULTY OF SOCIAL SCIENCES

54. Archaeology

SECTION – B

1. Discuss the various archaeological excavation methods.
2. Discuss the C^{14} method of dating.
3. Give an account of prehistoric cultures of Sohan valley.
4. Give an account of prehistoric art in India.
5. Discuss the Palaeolithic cultures of South Africa.
6. What are the salient features of Harappan culture ?
7. Give an account of Chalcolithic cultures in Maharashtra.
8. Discuss the schools of art that flourished under Kushanas.
9. Give an account of Gupta art.
10. Elucidate the development of temple architecture under the Pallavas.
11. Discuss the contribution of Chalukyas to temple architecture.
12. Write a note on the coins of Kumaragupta.
13. Bring out the salient features of Kushan coins.
14. Discuss the origin of Brahmi script.
15. Write a note on antiquity of writing in India.
16. Give an account of megalithic monuments with special reference to Kerala.

SECTION – C

1. Explain the term ‘primary sources’ and ‘secondary sources’ and their relevance for archaeological research.
2. Prepare a proposal on the Megaliths of Kerala emphasising the methods you would adopt for data collection and research.
3. Discuss the general formatting adopted in a research thesis.

55. Economics

SECTION – B

1. Balanced Vrs. Unbalanced Growth.
2. Revenue and capital accounts of public budget.
3. Oligopolistic coordination.
4. Economic growth and economic development.
5. Demonstration effect.
6. Cobweb theorem.
7. Index Numbers.
8. Fiscal Policy.
9. The liquidity trap.
10. Heckscher-Ohlin theory of international trade.
11. Finance Commission and its functions.
12. Disguised unemployment.
13. Highlights of Eleventh five year plan.
14. Arithmetic mean and its properties.
15. Consumer's equilibrium.
16. India and the IMF.

SECTION – C

1. How do you evaluate the recent measures adopted by the RBI to contain inflationary trend in the Indian economy ?
2. How will you design a research study to evaluate the problems of farmers in a typical village in Kerala ?
3. Critically evaluate the performance of Public Distribution System in India.

56. History

SECTION – B

1. Historiography
2. Oral History
3. Empiricism
4. Annales School
5. Structure-super structure
6. Subaltern studies
7. Nivarthana Agitation
8. Guruvayur Satyagraha
9. Dalit Movement
10. Kizhariyur
11. Electricity Agitation-1936
12. C.P. Ramaswamy Aiyer
13. American Model
14. Integration of Travancore and Cochin
15. Agrarian Reforms in Kerala
16. Post Modernism

SECTION – C

1. History is philosophy teaching by examples – Elucidate.
2. Explain the Marxian critique of Leopold Von Ranke with regard to objectivity in the doing of history.
3. What is hypothesis ? Is consciousness of social evolution mandatory for framing a hypothesis – Explain.

57. Islamic History

SECTION – B

1. Elaborate the basic forms of Muslim Historiography.
2. Analyse on the tribal structure of society in the pre-Islamic Arabia.
3. "The farewell sermon of Prophet Mohammad is a declaration of human rights". Elucidate.
4. Discuss the administrative and military reforms of Khalifah Umar.
5. Point out the characteristic features of the Khilafat-ur-Rashida.
6. Examine the reforms of Abdul Malik which strengthened the Umayyad Caliphate.
7. Examine how far the Abbasid Society was influenced by the Persian Culture.
8. Briefly describe the four schools of thought on Islamic Jurisprudence.
9. Examine how Arab Learning was transmitted to Europe.
10. Evaluate the role of Ala-ud-Din Khilji as a practical statesman.
11. Assess the influence of Islam on the Bhakti movement.
12. Examine the feasibility of Pan-Islamism in the world of Nation States.
13. Evaluate the contributions of Mohamed Ali as 'The father of Modern Egypt'.
14. Trace the basic concepts of Islamic economics.
15. Trace the evolution of the religious policy of Akbar.
16. Trace the origin and spread of Islam in Kerala.

SECTION – C

1. Discuss the influence of Islam on the development of Historical Consciousness.
2. What is objectivity ? Analyse its importance in the writing of history.
3. Prepare a synopsis on the topic, "Impact of modern education on Muslims of Kerala".

58. Political Science

(Including Public Administration)

SECTION – B

1. Summarise the ideas of Human Nature and Social Contract as formulated by Thomas Hobbes.
2. Review Hegelian views on Dialectics and State.
3. Bring out John Rawl's theory of Justice.
4. Write a note on State-Civil society interface in the era of globalization.
5. Distinguish between Interest Articulation and Interest Aggregation.
6. Examine the changing nature of Centre-State relation in the context of Globalization in India.
7. What are the scope and limitations of Judicial Activism in India ?
8. Examine the recent challenges to the sovereignty of the State.
9. Bring out the distinctive features of classical liberalism and contemporary liberalism.
10. What do you mean by Authority and Legitimacy ?
11. Examine the Marxian contributions on Base-Super structure Analysis.
12. Identify the Human Security Issues in the contemporary world.
13. Write a note on Politics-Administration dichotomy.
14. Bring out the significance of Rational Choice approach in the study of Public Administration.
15. Examine the theory of Scientific Management.
16. What do you understand by New Public Management ?
17. Comment on the impact of Globalization in Public Administration.
18. Examine the significance of E Governance in Indian Administration.
19. Write a note on Performance Budget.
20. Highlight the importance of Generalist Vs Specialist in Public Administration.

SECTION – C

1. Describe the significance of Social Science Research and its utility in the Contemporary World.
2. Write a synopsis with relevant details on the topic "Ideology vs Pragmatism : The Experiences of Coalition Politics in Kerala".
3. What is meant by data collection ? What are the factors to be considered while a researcher proceed for data collection ?
4. Prepare a Research Design on "Participatory Administration : A Study of Local Governments in Kerala".
5. Examine the importance of Questionnaire in the research on Public Administration. Prepare a Questionnaire on the topic "Role of Development Functionaries in Welfare Programmes of Kerala".

59. Psychology

SECTION – B

1. Partial correlation.
2. T-scores.
3. Learned helplessness.
4. Q-sorts.
5. Signal detection theory.
6. Experimental neurosis.
7. Korsakoff's disease.
8. Geometrical illusions.
9. Primary processes and secondary processes.
10. Temporal maze.
11. Perceptual constancies.
12. Locus of control.
13. Degrees of freedom.
14. Non-parametric statistics.
15. Semantic differential.
16. Forward conditioning.

SECTION – C

1. Elaborate on the strengths and weaknesses of correlational research.
2. Discuss the different methods of controlling relevant variables in quantitative research.
3. Give an account of the different methods of qualitative research in Psychology.

60. Sociology

SECTION – B

1. Mechanical and organic solidarity.
2. Pareto's classification of Residues and Derivations.
3. Social Mobility.
4. Ethno-methodology.
5. Phenomenology.
6. Post-structuralism.
7. Theory of Needs.
8. Middle range theory.
9. Totemism.
10. Quantitative method.
11. Use of internet in social research.
12. Objectivity in social science research.
13. Sanskritization.
14. Socialization.
15. Dialectical materialism.
16. Positivism.

SECTION – C

1. Examine the relevance of statistics in social science research.
2. Examine the suitable tool used for collecting data in a tribal community and give reasons.
3. Select a research topic and write the steps in social research.

61. Social Work

SECTION – B

1. Explain the treatment techniques in case work.
2. Discuss the role of a counsellor in school. What are the problems in educational counselling ?
3. How does poverty affect women, children and elderly ?
4. What are the elements of a research report ?
5. Briefly describe the nature and functions of family courts.
6. Explain the major provisions of Juvenile Justice Act 2000.
7. Write a note on the qualities and skills of a professional social worker.
8. Discuss the applicability of statistics in Social Work.
9. Explain the various steps in registering an NGO.
10. Describe the functions of social work.
11. What are the guidelines for preparing an interview schedule ?
12. What are the misconceptions which persist regarding mental illness ?
13. Bring out the importance of training in HSOs. What are the different types of training ?
14. Summarise the fundamental rights guaranteed by the Constitution of India.
15. Discuss the scope of social work in disaster management.
16. Write a note on motivational theories.

SECTION – C

1. Prepare a research proposal to assess the reproductive health awareness of rural women.
2. Explain the different types of research designs with examples.
3. Write an essay on various scaling techniques.