What is instructional technology? What are its characteristics? Write briefly the importance of instructional technology.

Ans: MEANING OF INSTRUCTIONAL TECHNOLOGY :

Instructional technology is a sub-set of educational technology, based on the concept that instruction is a sub-set of education. Instructional technology is a complex, integrated process involving people, procedures, ideas, and organization for analysizing problems, and devising, implementing, evaluating and managing solutions to those problems, in situations in which learning is purposive and controlled. In instructional technology, the solutions to problems take the form of instructional system components which are pre--structured in design or selection and in utilization and are combined into complete instructional system. These components are-Messages, Materials, Devices, Techniques and Setting.

Instructional technology is a network of techniques or devices employed to accomplish certain defined set of learning objectives. It implies the application of psychological, sociological and scientific principles and knowledge to instruction for achieving the specific objectives of learning.

NATURE/CHARACTERISTICS OF INSTRUCTIONAL TECHNOLOGY:

1) It is a part of educational technology.
2) It also covers the processes and system of learning and instruction.

3) It's basis is science. It studies the science and technology use of on education.
4) It is continuous, dynamic, progressive and effect producing method.
5) It describes all tools that are used for teaching and learning like-cameras, CD players, computers, GPS service, calculators, electronic tools etc.
6) It develops new concepts like programmed learning, micro teaching, simulated teaching, videotape, projector etc.
7) It accepts school as a system. It cannot solve each and every problem of education.
8) It can be used only in teaching and instructional system only.
9) It is helpful in achieving cognitive objectives.
10) It cannot replace the teacher.
11) It can control individual differences.

IMPORTANCE OF INSTRUCTIONAL TECHNOLOGY:

Instructional technology is a kind of educational technology that is meant for helping the instructor and learner in the desired instructional task or the realization of the stipulated instructional objectives in a particular teaching-learning situation. For better and effective learning, instructional technology help us in the following ways:

i) It gives a great help in achieving cognitive objectives.
ii) Individual differences can be controlled through this technology, because students can learn according to their own pace.
iii) It is a clear indication for psychological learning theories and principles.

iv) Reinforcement and learning, external condition, contiguity, practice can be effectively utilized with the help of instruction.

v) Effective teaching can be possible through instructional technology.

vi) It is helpful in providing deep insight into the content structure and sequence of its elements.

vii) The goal of instructional technology is to understand how people learn and how to best design instructional systems and instructional materials to facilitate that learning.

What is programmed instruction? Discuss the principle of programmed learning.

Ans: Programme is a device to control the student behavior and help learn without the supervision of a teacher. It is the subject to be learnt by the pupil. Programme learning is an application of the principles of behavioral science and technology in the field of education. It is a new path towards automation and an individualized education. The English educators prefer the use of programmed learning and on the other hand, the American writers use the term programmed instruction.

Programmed learning/instruction involves controlled, carefully specified goals to secure and skillfully arranged learning experiences. They are self-instructional and self-corrective Programmed learning/instruction is highly individualized which is a systematic instructional strategy for classroom as well as self-learning.

FUNDAMENTAL PRINCIPLES OF PROGRAMMED LEARNING:

The studies and researches done in the field of programme instruction have led to formulate some fundamental principles which are explained below-

1. **Principle of Small steps**: Giving the learner only that amount of information which he/she can handle at one time is called principle of small steps. The basic assumption of this principle is that one learns better if the content presented to him in suitable small steps. In programming, we divide the task to be learnt into very small steps and ask the-students to learn only one step at a time.

   Principle of active responding : According to psychological principle, students learn better and faster when they actively participating in the classroom teaching- learning process. In programme instruction, the students are required to continuously respond and interact with the programme. The students remain active to every frame presented to them. The learner may not feel any difficulty in moving from one frame to another and remains busy and active by responding to the frames.

2. **Principle of immediate re-inforcement** : This principle is based on the psychological phenomenon of reinforcement. Accordingly, one learns better when he comes to know immediately whether his answer is right or wrong.

3. **Principle of Self-Pacing**: Programme instruction is a technique of individualized process. According to this principle, learning take place effectively if the learner is allowed to learn at his own pace. In it, individual difference of the learners are well recognised. Therefore, the materials of programming should be based on the principle of self-pacing so that the learner moves from one frame to another according to his own speed of learning.

4. **Principle of Student testing :** In programmed learning, the student is tested continuously. The learner has to leave the record of his responses because he is required to write his responses on the sheet. Whenever there are more wrong answers, the programmer is able to detect the reasons and accordingly, he tries to revise and improve the programme. Thus, there is a continuous evaluation of the students performance as well as of the programme itself.

Define programmed learning/instruction. Make a comparison between programme learning and traditional learning.

Ans: Different definitions given by different scholars in understanding the meaning of the term programmed learning or programmed instruction are stated in below—

1. **Arthur A. Lumsdaine-**"An instructional programme is a vehicle which generates an essentially reproducible sequence of instructional events and accepts responsibility for efficiently accomplishing a specific change from a given range of initial competencies."
2. **Edgar Dale-**"Programmed learning is a systematic step by step, self-instructional programmed aimed to ensure the learning of stated behaviour."
3. **James E. Espich and Williams-**'Programmed instruction planned sequence of experiences, leading to proficiency, in terms stimulus response relationship that have been proved to be effective."
4. **Markle, S. M-** "It is a method of designing a reproducible sequence of instructional events to produce a measureable and consistent effect on behaviour of each and every acceptable students."

Difference between programmed Instruction and Traditional Teaching : A comparison between programmed instruction and traditional teaching will help us to give a clear understanding of programmed learning. Some of the main points of comparison are given below-

Programmed Instruction	Traditional Teaching
1. It is based on individualisation of instruction.	1. It is a collective and group technique of teaching.
2. It follows the fundamental principles of teaching.	2. It finds difficulty in applying the fundamental principles in overcrowded classrooms.
3. It presents the instructional matter step by step in logical sequence.	3. It presents instructional matter as a whole
4. It provides immediate feedback to the learners.	4. It does not give immediate feedback to the learners.
5. The objectives of learning is very clearly defined.	5. The objectives are not well-defined. Ii is usually vague in nature.
6. The subject matter is presented to the students in small units so that they can follow easily.	6. The subject matter is presented as a whole. Expect response from the students in the form of answers to question.
7. It keeps the students actively involved in the lesson by making response continuously.	7. The students remain passive. They are expected not to give any response for quite sometimes when the lesson is on.
8. The programmed material is empirically tried out and is refined gradually.	8. It is difficult to modify the traditional instruction on the basis of students reaction.

9. There is an interaction between students and subject matter.	9. There is a little interaction between students and teacher.

4 [redacted] **Discuss the different steps in developing programmed learning material.**

Ans: [redacted]

STEPS IN PROGRAMMING :

1) **Selection of Topic:** The programmes should select the most familiar topic; otherwise the programmer has to take the help of a subject expert.
2) **Content Outline :** After topic selection, its outline may be prepared which cover all the materials, one plans, to teach. For this programme one has to refer to examine relevant books and materials.
3) **Setting Instructional Objectives :** Instructional objectives must be formulated which involve both task description and task analysis. The former is the description of terminal behaviours which the learner is expected to achieve and the latter is the series of component behaviours that he is required to acquire in the process of achieving terminal behaviour.
4) **Entry Skill :** The learner should have some pre-requisite ability and skill to understand properly the new programme. This background experience is called the entry skill and a suitable programme cannot be prepared without proper assessment of the entry skill.
5) **Presentation of the Material:** Suitable format is to be decided for presenting the material from the educational point of view. Then the programmed material should be presented

in a sequence of frames arranged as steps towards terminal behaviour.

6. **Participation of Students :** On analysis of the terminal behaviour one will find the critical responses of the students.
7. **Terminal Behaviour Test :** The effect of programme can be ascertained by administering the terminal behaviour test. It is also known as performance assessment.
   This provides feedback to the programme and shows the effectiveness of the instructional materials.
8. **Revision :** Lastly the programme may be revised on the basis of feedback. The instructional materials may be edited and modified according to the needs and requirements of the target audience.

6. What is linear/extrinsic programming? Mention the characteristics of a good linear. Discuss the merits and demerits of linear programming.

Ans: Linear or Extrinsic Programming : This style of programming is associated with the work of B. F. Skinner and Dr Holland of Harvard University. It is directly related with the theory of "Operant Conditioning." It is also known as "Single track programming." It is believed that human behaviour can be shaped or controlled gradually with a suitable reinforcement.

The linear programme is generally response-centered. Here, all the students read and respond to the some frames. These frames are presented to the learner in the arranged sequence one at a time. The students are required to respond actively and there is immediate reinforcement provided for each response.

A linear programme is called a straight line programme as the learner starts from his initial behaviour to the terminal

behaviour following a straight line. Students proceed from one frame to the next until they completes the programme. "

CHARACTERISTICS OF A GOOD LINEAR :

1) It is precisely written in transparently communication media and optimum size.
2) Its printing is neat and clean and it is free from mistakes.
3) It is accompanied with a self-explained set of instructions.
4) Each item are arranged in a logical sequence in order of increasing difficulty and complexity of concept.
5) It controls the individual differences of the learner.
6) It provides reinforcement to the learners.
7) It is designed in logical sequence of content structure.
8) It provides the learning by doing situation.

Advantages of Linear Programming :

1) Series of small steps make the subject matter easy for the learner.
2) The learner has to respond actively to each step or frame.
3) The chances of error are minimised because subject matter is in properly sequenced small steps.
4) It allows self-pacing i,e one can learn according to one`s own speed.
5) Immediate knowledge of results release tension and anxiety of the learners.
6) Repetition ensures learning to further strengthens the purposes.

Disadvantages of Linear Programming :

The linear programming suffers from some drawbacks which are given below-

1. As linear is a single track programme, learning may becomes uninteresting and dull.
2. There is no development of imagination or creativity, because every learner gives the same answers.
3. Another disadvantages is that every learner has to follow same track rigidly, so there is no flexibility.
4. It is confined to the limited subjects and topics.
5. There is also dearth of good teachers for preparing the programme with proper sequence.
6. It may encourage guessing as the learner get some clue for his response.
7. It does not permit differentiation amongst answers. So, it is unable to develop discriminating power of the learners.

. What is branching or intrinsic programming? What are its types? Discuss the principles of branching programming.

Ans: BRANCHING OR INTRINSIC PROGRAMMING:

Norman A. Crowder, the American psychologist had developed the Branching or Intrinsic programming. According to him, a programme which adapts to the needs of the students without the medium of any extrinsic device like computer. It provides an intrinsic arrangement in which the learner is free to make decisions and able to adapt the instruction to his need. It is followed by multiple-choice answers, only one of which is correct. The learner is required to pick up one right answer out of many responses presented to him. In the presented responses, one response is correct and all others are incorrect. If the learner make a wrong choice are asked to follow another branching

which corrects their error. The errors are diagnosed and remedial measures is provided.

The learner is told why it was wrong and either return to the main stem to re-read the information along with remedial sequence.

There are two teaching of Branching Programme like techniques:

a) **Backward programme** : If the learner makes an error, he has to taken to the remedial frame where he has given some more help in understanding the concept and solving the problem. Then, he will be directed to the original frame number one. So the learner goes through the same frame twice i.e. once before the remedial material.

b) **Forward Programme** : Here, when the learner is making correct response or wrong response, he will be going to the next or new page. If he makes wrong choice he is directed to remedial frame where his mistakes are fully explained, followed by another parallel question from which he goes to the next frame in the main stream.

PRINCIPLES OF BRANCHING PROGRAMMING:

1. **Principle of exposition-Here,** the whole concept is presented to the student so that he can learn better the complete information which is provided in the - home page. It serves two purpose : teaching and diagnosis.
2. **Principle of diagnosis** : Here the weakness of learner is identified after exposition and hence we can assess whether the learner could learn what the causes are for it, then it can modified.

3. **Principle of remediation** : If a learner chooses wrong alternately, then the learner has to move to a wrong page where remedial instruction is provided and directed to return the home page and he/she is asked to choose the right answer.

9. **What is mathetics? What are the characteristics of mathetics programming: Mention the advantages and limitations of mathetics programming.**

Ans: MATHETICS PROGRAMMING:

Mathetics is the most controversial approach to programmed instruction. The founder of mathetics is Thomas F. Gilbert and it was developed by him in 1962 '

The term "Mathetics" is dervied from the Greek 'Mathein' meaning 'to learn". A mathetics programme begins with an instructional plan and a detailed analysis of what is to be taught, Gilbert emphasizes that analysis must concentrate on learner activity, not subject matter courage/coverage. The system is quite technical but is very helpful in learning difficult skills, shaping desired results over the subject-matter. This programme may be used for any subject, but the emphasis on task simulation makes it more suitable for teaching skills where 'transfer of training forms an essential part of instruction. In mathetics programming, frames size is organized in small step but in a reverse chain i.e. from complex content to its small, simple units to attain mastery level. Frame structure is based on Demonstration-Prompts-Release.

CHARACTERISTICS OF MATHETICS PROGRAMMING :

The main features of mathetics programming are given below-

a) The unit for mathetic sequence is called exercise.

b) There is no restriction on its size. It is determined by how a big step a student can take at a moment.
Each exercise assumes the reinforcement value of accomplishment.

c) Chaining of responses helps in learning to reach up to mastery level.

d) It makes use of the technique of backward reverse chaining.

e) Reverse chaining of stimuli helps in learning, i.e. from whole to part, from complex to simple.

ADVANTAGES OF MATHETICS PROGRAMMING:

i) It is a task oriented programme.

ii) Result can be linked to concrete goals which we intend to achieve through a mathetics programme.

iii) Its stress on learner success at 90/90 criterion level of mastery which motivates the learner.

iv) It utilizes the principal of backward chaining.

v) It is relevant, significant, meaningful and valid in the eyes of the learner and programmer.

LIMITATIONS OF MATHETICS PROGRAMMING :

i) Main emphasis is on mastery of the content rather than changes in behaviour of the learner.

ii) Retrogressive chaining of stimuli if not effective for terminal behaviour.

iii) It is very difficult to develop retrogressive learning package.

iv) It is very technical in nature and such as demands a lot of skill, training a labour on the part of the programmer.

v) It is not suitable for learning the material of all subjects.

vi) Mathetics cannot be used for factual content.

Q. Discuss the merits and demerits of programme learning.

Ans: MERITS AND DEMERITS OF PROGRAMMER LEARNING:

Programmed learning may prove quite useful to the students, teachers and educational administration from different angles. The advantages of programmed learning can be stated as below:

1. It makes the students active and self-reliant.
2. It may help in individualizing the instructional process. Every student proceeds at his own pace.
3. There is a immediate reinforcement which motivates the students for further learning.
4. It may help the teachers in the reduction of the total load of work. Programmed materials are never tried and never lose their patience or temper.
5. It develops a scientific attitude among the learners as they are able to think rationally and logically.
6. It is quite useful for guidance and remedial instruction. It helps the teacher to diagnosis the problems of the individual learner.
7. It involves both learning and evaluation. Therefore, it is a good self-learning and self-evaluation.

8. Students are exposed only to correct responses, therefore, possibility to common errors is reduced.

Programmed learning is an autocratic and individualized strategy. It is based on psychological principles of operant conditioning theory. The response of the learner are strictly controlled by the programmer. Though it has a large number of advantages, but not free from shortcomings. Some of the disadvantages which are stated below—

1) Only cognitive objectives can be achieved.
2) There is no chance for students creativity, their responses are highly structured.
3) Due to tight schedule of time table, students cannot be left to learn at their own pace. It would very difficult to learn the content and subject matter in a limited period of time.
4) The preparation of programmed instruction material is time demanding and many hours are usually required to produce a unit.
5) Programmed instruction can result in frustration if a learner cannot follow the pace of his peers, paying loss attention due to over prompting.
6) Programmed instruction restricts the learner's freedom of choice resulting in cramping of his imagination and initiative.
7) Relation between teacher-pupil is so vital, but through programmed learning it is not strengthened.
8) There is no flexibility as every learner has to follow the same track rigidly. Although, Programmed learning or instruction is also not exempted from shortcomings, but it represents one of the effective innovations in the teaching

learning process. As a highly individualized and systematic instructional strategy it has been found quite useful for classroom instruction.

11. Mention the characteristics of instructional technology. Distinguish between educational and instructional and instructional technology.

Ans: Nature and Characteristics of Instructional Technology (IT)

1. Instructional technology is concerned with the cognitive development of the learner, i.e., with the knowledge aspect of the learner.
2. It gives individual freedom to each learner to learn at his/her own rate of speed. It tries to reduce the problem of individual difference of the leaner.
3. It provides continuous reinforcement to the right response of the student to strengthen their mental position.
4. It is based on the psychological theories and principles of learning.
5. Instructional technology helps in making instructional theory more effective in the process of learning.
6. Instructional technology can be better used for improving the efficiency of the teacher.
7. In instructional technology more emphasis is given on the analysis of the content, composition and sequence of the elements of learning material.
8. It can fulfill the need of self-instruction of the learner as well as can serve the purpose of correspondence education and remedial teaching.

Difference Between Educational Technology and instructional Technology

Educational Technology	Instructional Technology
1. Educational technology is a vast concept including the recent discoveries of science and technology to the process of education.	1. It is only a component of the broad educational technology.
2. Its goals are determined by the demands of the country.	2. Here the determinants of the goals are learner themselves or the local needs.
3. It undertakes long-term projects with wide perspective of the nation.	3. It undertakes short term project to solve problems either of school or classes.
4. Its effectiveness is measured by considering the ultimate needs of the nation.	4. Effectiveness of instructional technology in measured keeping in view the specific expectation of the learner.
5. Educational Technology produces teaching material such as books, different types of software materials. Hardware materials, system approach etc. to benefit all the pupils of the nation.	5. It produces teaching materials to meet the needs of the local learners.
6. It constructs the media to increase the effectiveness of teaching-learning process of the entire country.	6. Here educational media is selected considering the need of a particular class or group of pupils.
7. Its objective is to modernise the learning methods and technique systematically to make them effective to meet the need of the changing era for the future.	7. It is concerned with objective of making maximum use of existing learning method and technique to meet the requirement of the pupils in the classroom or school.
8. Behavioural out comes are decided on the basis of the needs of the nation.	8. Behavioural outcomes are decided on the basis of specific expectation out of the learner.
9. Feedbacks, for all the skills of teaching integrated in a media are necessary to improve teaching-learning.	9. Feedback for that specific teaching skill through which teaching is going on is necessary to make teaching-learning effective.

Q. Explain the concept of system approach. Discuss the procedural steps in the system approach.

Ans: THE CONCEPT OF SYSTEM APPROACH

A system by way of description is a holistic way of viewing things. It generates from the idea that a "whole" is made up of separate parts but each part works cooperatively to make for efficient performance. In other words, the philosophical saying-"A whole is greater than the sum total of its parts-actually describes what a "system" is.

This "system" view can be applied to educational and instructional processes. This is so when "education" and "instruction" are viewed as concepts with separate and yet interlocking parts which function together to achieve predetermined objectives. When "System" is used in an applied form as is the case above, we then talk of "systems approach" Systems Approach (SA) can thus be defined as a systematic process of solving problems, particularly educational or instructional problems. Webster's dictionary defines a system as "a regularly interacting or independent group of items forming a unified whole."

Systems Approach is a problem-solving process in which the problem solve engages in series of steps-taking at solving a particular identified educational problem. Broadly speaking systems approach comprises of two major parts, namely : (i) system analysis, and (ii) system synthesis.

By system analysis we are speaking of a process whereby a given problem is broken down into bits. It is at this stage that

the actual problem is identified and analyzed with a view of setting goals or objectives.

Procedural steps in the system approach in Educational Technology Identifying

Objectives: This step includes

1. Deciding the general aims of the course
2. Deciding the future aims of the students in target.
3. Know the previous knowledge, understanding level, interest, attitude, aptitude and background of the students:
4. Deciding the learning experiences that the students should go through.
5. Deciding about the test on the basis of which evaluation will be made and to find out the extent to which objectives has been achieved.

Designing Learning Experiences: This step includes

1. Visualizing the conditions needed for achieving the objectives.
2. Determine the learning sequences.
3. Deciding the strategies for teaching.
4. Selecting the appropriate teaching method, media, and material for achieving the objectives.
5. Preparing the recording of experiences.

Evaluating the Effectiveness in achieving the objectives: This includes

1. Engaging the students in the learning experiences designed.
2. Applying the test to evaluate how much and which objective has been achieved widely.
3. Finding out if any pre determined objective has been achieved or not.

Modifying Learning Experiences: This step includes:

1. Identifying the strength and weakness of the course.
2. Identifying the processes to be improved.
3. to revise course and evaluation of it.
4. Updating the course on the basis of evaluation.
5. Restarting the improved course again.

These are some general steps which could be followed in system approach. In this Process a teacher plays the most important role as he is the most important person in designing and executing the learning experiences for students.

Q. Define system approach. Discuss the role of the teacher in the process of system approach.

Ans: Definitions of System Approach

- In view of A. k Jalaluddin "A system may be defined as a dynamic, complex, integrated whole consisting of self-regulating pattern of interrelated and interdependent elements organized to achieve the pre determined and specified objectives".
- According to Banghart (1969) a system is "an integrated assembly of interacting elements, designed to carry out cooperatively a predetermined function .
- Bertalanffy (1951) defines a system as "any arrangement or combination, as of parts or elements, in a whole".
- Crawford Robb (1973) defines "system is a systematic organisation of the elements that operates in a unique way.
- According to Hickey (1960), "a system is an assemblage of objects united by some form of regular interaction or interdependence, which collectively contribute towards an important and complex function".

Role of the teacher:

1. A teacher should always assess how much his/her inputs have been successful.
2. If any improvement needed a teacher should always find alternative processes.
3. A teacher should always gather requisite information regarding the topic concerned.
4. The teacher is the person who executes the plan into action.
5. The teacher has to evaluate the system and gather feedback.
6. Modify the needed component of the course on the basis of feedback.
7. The teacher should assess the effectiveness of the programme.
8. The teacher should assess the outcome of the process on the basis of achievement of the pre-determined objectives.

The system approach should be introduced as an integral part of the whole educational environment. Its application in the education system will surely make the education system self maintaining with its basic parameters operating scientifically on the principle of feedback of equilibrium. The purposes served by system approach in education has been summarized below

1. Use of system approach can effectively improve the instructional system.
2. It can bring efficiency in the school administration and management.
3. It helps to identify the suitability or otherwise of the resources to achieve the specific goal.
4. It helps in utilizing the maximum of the man, material and resources.

5. It helps in planning the educational programmes systematically in terms of the pre-determined objectives.
6. Use of system approach helps in bringing improvement in the examination and evaluation system.
7. It helps in framing the proper curriculum and organizing the proper co-curricular activities.
8. It can be effectively used in planning the training programmes.
9. This approach is helpful not only for the formal system of education but also for the system of education also.
10. As system approach needs continuous and comprehensive evaluation it always calls for improvement in the system.