

# MG6851 PRINCIPLES OF MANAGEMENT

## TWO MARKS QUESTIONS AND ANSWERS

### UNIT I

#### 1. What is Management?

Management is the process of giving direction and controlling the various activities of the people to achieve the objectives of an organisation.

#### 2. Define Management.

According to Knottz & Wehrich “management is the process of designing and maintaining of an environment in which individuals working together in groups efficiently accomplished selected aims”.

#### 3. Write some characteristics of Management.

- 1) Management is a continuous process.
- 2) Managers use the resources of the organisation both physical as well as human to achieve the goals
- 3) Management aims at achieving the organisation goals by ensuring effective use of resources.

#### 4. What are the roles of management in organisation?

- 1) Managements help in determination of the objectives of an organisation.
- 2) Economics and social development takes place through management

#### 5. Write any two points favour for management as a science.

- 1) Management principles should be verifiable
- 2) Reliable basis for predicting future.

#### 6. Write any two points favour for management as an art.

- 1) Management is creative.
- 2) Management includes the use of practical knowledge and personal skill.

#### 7. What is Time study?

The movements which takes minimum time is the best one .

#### 8. What is motion study?

Taylor suggested that eliminating wasteful movements and performing only necessary movements.

#### 9. Write Fayol's fourteen principles of management.

- 1) Division of work.
- 2) Authority and Responsibility.
- 3) Discipline
- 4) Unity of command
- 5) Unity of direction
- 6) Individual interest to general interest.
- 7) Remuneration.

- 8) Centralisation
- 9) Scalar chain
- 10) Order
- 11) Equality.
- 12) Stability
- 13) Initiative
- 14) Esprit de corps

**10. What is authority?**

It is the power given to a person to get work from his subordinates.

**11. What is responsibility?**

It is the amount of work expected of a man by his superior.

**12. Comment: Management is both – A science and an art.**

Management is a science because it contains general principles. It is also an art because it requires certain personal skills to achieve desired result.

**13. What is centralization?**

The organisation is centralized when the power is concentrated with one person.

**14. What is decentralization?**

If the power is fully distributed to the subordinates of the organisation.

**15. What is scalar chain?**

The instruction and orders should be sent from the top management to the lower management.

**16. What are management levels?**

- 1) Top-level management.
- 2) Middle level management
- 3) Lower level management

**17. Write some important functions of top management.**

- 1) To formulate goals and policies of the company.
- 2) To formulate budgets
- 3) To appoint top executives

**18. Write any two functions of middle level management.**

- 1) To train, motivate and develop supervisory level.
- 2) To monitor and control the operations performance.

**19. What are essential skills needs for the manager?**

- 1) Technical skill.
- 2) Human skill
- 3) Conceptual skill

**20. Write the function of management.**

- 1) Planning
- 2) Organising
- 3) Staffing
- 4) Coordinating
- 5) Controlling

**21. What is social responsibility?**

Society is the part of the management to initiate actions either to protect social interest of the society.

**22. List out the groups' responsibilities of management .**

- 1) Shareholders
- 2) Employees
- 3) Customers
- 4) Creditors
- 5) Suppliers

**23. What is ethics?**

All individuals in business or non-business activities are concerned with some standardized form of behaviour are known as ethics.

**24. What is ethics in management?**

- 1) Business ethics deals with morality of the business environment.
- 2) Business ethics relate to the behaviour of a businessman in a situation.

## **UNIT II**

**1. What is planning?**

Planning is the process of selecting the objectives and determining the course of action required achieving these objectives.

**2. State the important observations suggested about planning.**

Planning is outlining a future course of action in order to achieve on objective.

Planning is looking ahead.

Planning is getting ready to do something tomorrow. Plan is a trap laid down to capture the future.

**3. List out the features of planning.**

Planning – a primary function

Planning - a dynamic process

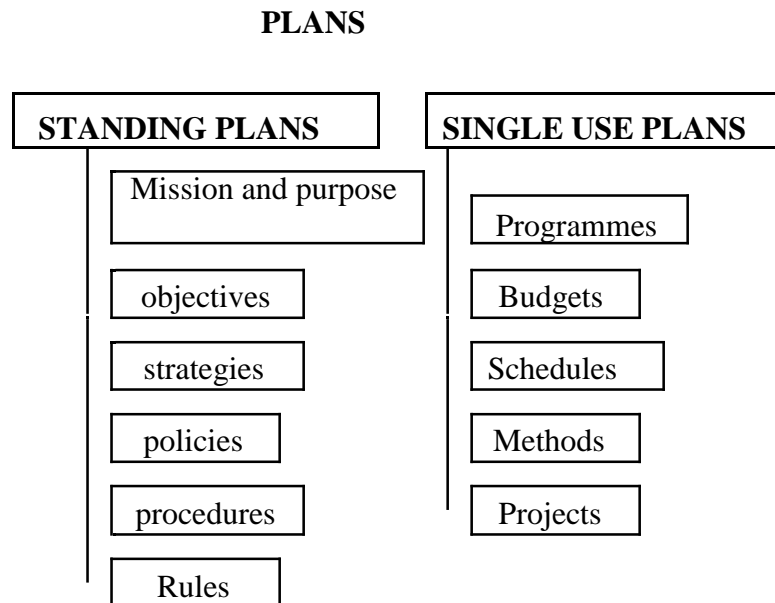
Planning – based on objectives and policies

Planning – a selective process

Planning – an intellectual process

Planning is based on facts

#### 4. Classify various plans.



#### 5. Define mission

Mission may be defined as a statement which defines the role that an organisation plays in the society.

#### 6. State the important questions to answer by a good mission.

1. What is our business?
2. What should it be?

#### 7. Define objectives.

The terms objectives or goals are often used interchangeably. Objectives are the end results towards which the activities of firm are aimed or directed.

#### 8. What is meant by strategies?

Strategy of an organisation is the programmes of action and deployment of resources to attain its objectives.

#### 9. Define policies.

Policies are general statement or understandings, which provide guidance in decision making to various managers.

#### 10. What is procedure?

A procedure is a chronological order of actions required to implement a policy and to achieve an objectives.

#### 11. Name any two important procedures in organisation.

Procedures for placing orders for material and equipment.

Procedures for sanctioning different types of employee's leave.

**12. Define budgets.**

A budget is a statement of expected results in numerical terms and therefore it may be referred as a numerical programme.

**13. Give the flow diagram of planning steps.**

IDENTIFICATION OF OPPORTUNITIES

ESTABLISHMENT OF OBJECTIVES

DEVELOPING PLANNING PREMISES

IDENTIFICATION OF ALTERNATIVES

EVALUATION OF ALTERNATIVES

SELECTING AN ALTERNATIVES

FORMULATING DERIVATIVE PLANS

ESTABLISHING SEQUENCE OF

ACTIVITIES

**14. What are the advantages and limitations of planning?**

**Advantages**

- Help in achieving objectives;
- Better utilization of resources;
- Economy in operation;
- Improves competitive strength

**Limitations.**

- Lack of accurate information
- Time and cost
- Inflexibility

- Delay during emergency period

**15. What is objective?**

Objectives are the aims, purposes or goals that an organization wants to achieve over varying periods of time.

**16. State the two approaches of objectives.**

- Top –down approach.
- Bottom –up approach.

**17. What is MBO?**

MBO is a process whereby, the superior and the subordinate managers of an enterprise jointly identify its common goals, define each individual's major areas of responsibility in terms of results expected of him, and use these measures as guides for operating the unit and assessing the contribution of its members.

**18. Mention the features of MBO.**

- MBO focuses attention on what must be accomplished and not how to accomplish the objectives .it is a goal oriented rather than work-oriented approach.
- MBO tries to combine the long range goals of organisation with short range of organisation.
- A high degree of motivation and satisfaction is available to employees through MBO.

**19. What are the major kinds of strategies and policies?**

- Growth.
- Finance
- Organisation
- Personal
- Products or services
- Market

**20. Classify policies.**

- Formulated policies
- Appreald policy
- Imposed policy
- Written policies
- Implied policies

**21. What is planning premises?**

The assumptions about future derived from forecasting and used in planning are known as planning premises.

**22. State the classification of planning premises.**

- i. Internal and External.
- ii. Tangible and intangible
- iii. Controllable and uncontrollable

**23. Define decision-making process.**

Decision –making is defined as the process of choosing a course of action from among alternatives to achieve a desired goal. It is one of the functions of management and also a core process of planning.

**24. What are the techniques useful while evaluating alternatives?**

- i. Quantitative and Qualitative analysis
- ii. Marginal analysis
- iii. Cost effectiveness analysis

**25. Classify decisions.**

- i. Programmed and non-programmed decisions
- ii. Organizational and personal decisions

## **UNIT III**

**1. Define organizing.**

Organising is the process of identifying and grouping of activities required to attain the objectives, delegating authority, creating responsibility and establishing relationships for the people to work effectively.

**2. Mention any four characteristics of an organization.**

Common objectives  
Specialisation or Division of labour  
Authority of structure  
Group of persons

**3. State the advantages of organization.**

Facilitate administration  
Increases the efficiency of management  
Facilitates growth and diversification  
Ensures optimum use of man and material resources

**4. List out the steps involved in organization process.**

Determination of activities  
Grouping of activities  
Assignment of Duties  
Delegation of authority

**5. Mention the three categories of span of management.**

Direct single relationship  
Direct

group relationships  
Cross relation

**6. What are the types of departmentation?**

Departmentation by numbers  
Departmentation by time  
Departmentation by Enterprise function  
Departmentation by Territory or Geography  
Departmentation by customers  
Departmentation by Equipment or process  
Departmentation by Product or service

**7. Give a note departmentation by customers.**

This type of departmentation is preferred when the needs of customers are different in nature. Some big organisation is providing special services to different of customer.

**8. Define authority.**

Authority is the right to give orders and the power to exact obedience.

**9. List out the sources of authority.**

Formal authority theory  
Acceptance authority theory  
Competence theory

**10. What is line authority?**

Line authority is the direct authority which a superior exercises over a number of subordinates to carry out orders and instructions. In organisation process, authority is delegated to the individuals to perform the activities.

**11. What is staff authority?**

The relationship between a staff manager and the line manager with whom he works depends in part on the staff duties.

**12. List the steps involved in process of**

**delegation.** Determination of result expected  
Assignment of duties  
Delegation of authority  
Creation of obligation or accountability

**13. What are the steps to be followed in making staff works effective?**

Understanding authority relationship  
Making line listen to staff  
Keeping staff informed  
Requiring completed staff work  
Making staff work a way of organisational life

**14. State the kinds of organizational charts.**

Vertical chart



Horizontal chart or left to right  
chart    Circular    chart    or  
concentric chart

**15. Define staffing.**

Staffing is the part of the management process which is concerned with the procurement utilization, maintenance and development of a large satisfied work force on the organisation.

**16. Write any two roles of staffing.**

Effective utilization of skills and potential of the work force  
Development and maintenance of quality of work life

**17. What is job analysis?**

Job analysis is a detailed study of a job to identify the skills, experience and aptitude required for the job.

**18. What is job design?**

The job design is usually broad enough to accommodate people's need and desires.

**19. What is job rotation?**

Job rotation refers in the movement of an employee from the job to another

**20. Define recruitment.**

B.Flippo defined recruitment as "the process of searching for prospective employees and simulating to apply for jobs in the organisation.

**21. What is selection?**

Selection is the process of finding out the most suitable candidate to the job out of the candidates attracted.

**22. Write down the tests used in selection process.**

Aptitude  
test  
Intelligenc  
e test  
Psychomoto  
r test  
Personality  
test

**23. What is orientation?**

Orientation refers to the activities involved in introducing the new employees to the organisation and its policies, procedures, rules, and regulations.

**24. What is performance appraisal?**

Performance appraisal evaluates the performance of worker also his potential for development.

**25. What are roles of manager?**

Inter-  
personal role

Information  
role  
Decisional

## UNIT IV

### 1. Define multiplicity of roles.

Individuals not only the productive factor in management's plans. They are members of social system of many organizations.

### 2. Mention the importance of motivation.

Proper utilization of human resources possible since it inspires employees to make best possible use of different factors of production.

Proper motivation improves the efficiency of operation. Motivation creates a willingness on the part of workers to do the work in a better way.

### 3. Name the steps involved in motivation process.

Analysis of situation

Preparing, selecting and applying a set of appropriate motivating tools. Follow up.

### 4. What are the types of motivation?

Positive motivation Negative motivation Extrinsic motivation Intrinsic motivation

### 5. List out the basic needs in a hierarchy.

Physiological needs Safety needs

Social needs Esteem needs

Self-actualisation needs

### 6. What is job enrichment?

Job enrichment is therefore based on the assumption that in order to motivate personnel, the job itself must provide opportunities for achievement, recognition, responsibility, advancement and growth.

### 7. Who is leader?

Leader is one who makes his subordinates to do willingly what he wants.

### 8. Define leadership.

Leadership is the process of influencing the behaviour of others towards the accomplishment of goals in a given situation.

### 9. What is communication?

Communication is passing of information from one person to another person.

### 10. State the need for communication.

To establish and spread goals of an enterprise widely. To develop plans for further achievement.

To organize human and other resources in the most effective and efficient way. To select, develop and apprise members of the organisation.

**11. List the different types of communication flow.**

Downward communication Upward communication

Horizontal or lateral communication

**12. Note down the various communicating networks.**

Simple chain Wheel

Circular Free flow Inverted V

**13. State the advantages of democratic leadership.**

The subordinates are motivated by participation in decision-making process. This will increase job satisfaction.

Absence of leader does not affect output.

Labour absenteeism and turn-over will be minimum. The quality of decision is improved.

**14. What are the barriers involved in effective communication?**

Physical barriers

Socio-psychological or personal barriers. Organisational barriers.

Semantic barriers. Mechanical barriers.

**15. List out the effective media in communication.**

A large bank supplies hardware and software to its customers. Several banks now make bank-by-phone services available even to individuals.

E-mail service making easy delivery of documents.

**16. What are the important assumptions made in X theory?**

The average human dislikes to work. He will avoid work if it is possible.

Therefore people must be controlled, directed and threatened with punishment

to make them work.

**17. Mention the various factors involved in using motivational techniques.**

Money

Participation

Quality of working life

**18. Mention the important of leadership.**

Motivating employees

Leader develops team work Building morale

Maintaining discipline

**19. Name the various leadership styles.**

Autocratic or dictatorial leadership. Participative or democratic leadership.

Laissez-faire or free rein leadership.

**20. What is Laissez-faire?**

Complete freedom is given to the subordinates so that they plan, motivate, control, and otherwise be responsible for their own actions.

**1. Define control.**

According to Koontz “Controlling to the measurement and correction of performance in order to make sure that enterprise objectives and the plans devised to attain them are accomplished”.

**2. What are the characteristics of control?**

Control process  
is universal  
Control is  
continuous  
process Control  
is action based  
Control is forward looking.

**3. What are the disadvantages of control?**

Control is expensive and time-consuming process.  
Human behaviour and employee morale also cannot be measured.

**4. Give some critical point standards of control?**

Cost standards  
Revenue standards Goals standards  
Program standards.

**5. What are the types of control?**

Feedback control Concurrent control Feed forward control

**6. What is feedback control?**

Feedback control is the process of adjusting future action on basis of information about past performance.

**7. What are the requirements for effective control?**

The control should be economical It must be simple  
It should be flexible  
It should be clear objectives

**8. What are the modern techniques of control?**

Management audit Return on investment PERT and CPM

**9. Define budgetary control?**

According to J.Batty “a system which uses budgets as a means of planning and controlling all aspects of producing and or selling commodities and services”.

**10. Define budget?**

According to J. Fred Meston “a budget is the expression of a firms plan in financial form for a period of time in the future”.

**11. What are the limitations of Budgeting?**

Inaccuracy Expenditure  
Distortion of goals

**12. What is Zero Base Budgets?**

Initially the budget is designed from a Zero base the main element is ZBB is future objective orientation.

**13. What are the steps involves in ZBB?**

**14. What is Internal Audit?**

Internal audit is done by an internal auditor who is an employee of the organisation. He examines the objectives, policies, plans, procedures and performance of the management.

**15. Define MIS**

A system of obtaining abstracting, storing and analysing data to produce information for use in planning, controlling and decision making by managers at the time they can most effectively use it”

**16. What are MIS Resources?**

To provide the information up to date To take effective decision making

To provide the right information available in the right form at the right time

**17. Define Productivity**

Productivity is a measure of how much input is required to produce a given output the ratio is called productivity.

**18. Define Multinational Corporations.**

An enterprise which own or control production or service facilities outside the country in which they are based.

**19. Write some advantages of MNC.**

MNC can promote quality product at lower cost.

MNC leads to increase in production aggregate employment, exports and imports of the required inputs.

MNC is paying taxes their operations increase government revenues.

**20. What are global theories of management?**

Situational and contingency approach. Motivation and leadership theory.

Organisational behavior.

**21. Write some characteristics of Japanese management.**

■ Japanese management prefer to human resources than it financial resources.

- Japanese management favours job security.
- Japanese are more favour to cooperation and teamwork.
- Japanese management encourage the lower level employees” participation .

**22. Write some limitations of Japanese management.**

Decision making process is time-consuming process.

Promotion policy is not encourage outstanding younger employee.

**23. Write some characteristics of German management.**

German management is autocratic. Labour suggestions also accepted.

Managerial decisions are taken by the executive committee consultation with labour direction.

**MG 6851 PRINCIPLES OF MANAGEMENT**  
**QUESTION BANK**  
**UNIT 1**  
**PART-B (13 Marks)**

1. Explain briefly about the various functions of Management. Explain the three levels of management.
2. What are the Henry Fayol's 14 principles of management or theory on administrative management?
3. Explain briefly about the different factors affecting the organizational environment.
4. Explain the different schools of management. Discuss the contribution of human behaviour school.
5. i) Define Management . What is meant by management process?  
Management: Science or Art – Discuss.
6. i) Explain about the various views on management and administration ii) Compare Management and administration.
7. Explain in detail about the contributions of Hawthorne experiments towards the development of management thought.
8. i) Write the characteristics and limitations of classical approach. ii) Compare and contrast Systems approach and contingency approach
9. What are the different managerial skills in organization hierarchy? management? Explain.
10. (i) Discuss the trends and challenges of management in global scenario.
11. Discuss the effects of globalization & liberalization in improving organizational growth.

**UNIT 2**

**PART-B (16 Marks)**

12. Explain the overall decision making process. Explain the process followed in normal situation.
13. Explain the various decision making techniques and the factors influencing it.
14. Explain the process of MBO. What are the benefits & limitations of MBO? How will you overcome the limitations?
15. (i) Explain the steps involved in strategic planning process.  
(ii) Distinguish between strategic planning & operational planning
16. What are the principles for formulating policy in a modern organization? Explain the essentials of formulating policies.

5. List the various techniques used in business forecasting. Explain any two in detail.
6. Distinguish between programmed & non-programmed decisions & discuss in detail about the modern approaches to decision making under uncertainties.
7. Explain the principle of planning & discuss the various types of organizational plans with its merits & demerit.
8. Explain briefly about the major kinds of strategies with examples.
9. Why planning is regarded as the primary function of management. Explain the various steps in planning.

### **UNIT 3**

#### **PART-B (16 Marks)**

1. Explain briefly about the various types of Departmentation. Explain its need & importance.
2. (i) Explain briefly about the various types of Organizational structures. (ii) List out the difference between Formal and Informal organization.
3. Discuss the span of management/managerial effectiveness. Explain the factors that influence the effective management.
4. (i) Explain briefly about the overall selection process.  
(ii) Explain about the human resource planning.
5. Delegation is the ability to get result through others – Discuss. Explain the steps & guidelines while delegating authority.
6. Define Matrix organization why matrix organization is used? Discuss the advantages & problems. Give guidelines for making Matrix management effective?
7. Explain the concept of decentralization along with its merits & demerits. How can decentralization be effective?
8. Discuss the merits and demerits of a line and staff organization with examples. Compare Line with line & staff organization.
9. Explain the various methods of training.
10. Describe the various types of performance appraisal.

### **UNIT 4**

#### **PART-B (16 Marks)**

1. Explain briefly about three theories of Motivation. Discuss in detail about the types of Motivation.
2. (i) Good communication is the foundation of Sound management. Comment.
  - i. Why is management by wandering around considered effective communication?
3. Discuss in detail about the Creativity and Innovation.
4. What do you understand by leadership style? Explain the various types of Leadership styles.
5. Explain the different characteristics of a Leader and various functions of Leader
6. (i) Discuss the effect of electronic media in communication process. (ii) Write a brief note on barriers to communication & communication

network.

7. Explain briefly about the Maslow's need hierarchy Compare and contrast Maslow and Herzberg theory.
8. Explain the importance of communication. Explain the different forms and types of communication process.
9. Define the barriers involved in effective communication. Explain few suggestions to overcome them.
10. (i) What is organizational culture? Explain in detail about the various types of culture  
.Difference between Motivation and Satisfaction.

## **UNIT5**

1. Explain the steps in the process of controlling.
2. Measuring performance
3. Comparing the actual performance with expected performance
4. Explain the role of MIS play at various levels of management.  
What are the effective steps for direct control and preventive control?
- 5) What are the factors affect the operations of the multinational enterprises.
- 6) Explain a unified global theory of management (or) Explain in detail the preventive control mechanism towards achieving a unified global management theory.
- 7) Explain the difference between Japanese and US Management.
- 8) Explain in detail about MNCs.
- 9) Discuss in detail about the techniques used for improving Productivity. (Or) What tools & techniques you suggested to improve productivity in Indian organization
- 10) Explain the term „Reporting”.



**V.S.B ENGINEERING COLLEGE, KARUR**  
**DEPARTMENT OF CIVIL ENGINEERING**  
**CE6016- PREFABRICATED STRUCTURES**

**UNIT I - INTRODUCTION**

**Need for prefabrication – Principles – Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection.**

**PART – A (TWO MARKS)**

**1. What is meant by modular co-ordination? (AUC NOV/DEC 2012 & 2013)**

Modular coordination is a concept for coordinating dimension and space for which building and component are dimensionally fit used and positioned in basic units (or) modules. The standard specify that the module basic  $M = 100$  mm. As the basic unit be used in a square of  $M$ .

**2. What are the production techniques? (AUC NOV/DEC 2013)**

- The term production techniques describe a series of operation directly concerned in the process of making or more apply of molding precast units.
- These techniques grouped into three basic methods of production.
- The stand system
- The conveyor belt or production line system
- The aggregate system

**3. List out the limitations of prefabrication. (AUC NOV/DEC 2012)**

- Extra reinforcement is required to take care of handling and erection stresses.
- Temporary properties may be required in some cases before the un-site concrete joints achieve strength.
- The cracks may develop at the joints between the precast in site concrete due to shrinkage and temperature stresses. To overcome them extra steel is required across joint.

**4. List the advantages and disadvantages of prefabricated system. (AUC MAY/JUNE 2012)**

**Advantages:**

- Self supporting readymade components are used, so the need for formwork, shuttering and scaffolding is greatly reduced.
- On-site construction and condition is minimized.
- Less waste may occur.

**Disadvantages:**

- Careful handling of prefabricated components such as concrete panels (or) steel and glass panels is reduced.
- Similarly leaks can form at joints in prefabricated component.

**5. List the system for prefabrication. (AUC MAY/JUNE 2012)**

- Large panel systems
- Frame systems
- Slab-column systems with walls
- Mixed systems

**6. What are the methods for Manufacture of precast concrete elements (or) types of prefabrication? (AUC MAY/JUNE 2013)**

- Factory prefabrication
- Site prefabrication

**7. What are the classifications of prefabrication? (AUC MAY/JUNE 2013)**

- Small prefabrication
- Medium prefabrication
- Large prefabrication
- Cast in – site prefabrication
- Off-site (or) factory prefabrication

- Open system of prefabrication
- Closed system of prefabrication
- Partial prefabrication
- Total prefabrication

### **8. What is the need for pre fabricates structures?**

- Prefabricates structures are used for sites, which are not suitable for normal construction method.
- PFS facilities can also be created at near a site as is done to make concrete blocks used in place of conventional brick.
- Structures which are used repeatedly and can be standardized.

### **9. What is the Production process?**

The production of concrete blocks consists of four basic process. They are,

- Mixing
- Moulding
- Curing
- Cubing

### **10. Explain the conveyor belt or production line system in production technique?**

The conveyor belt system of production splits the whole production process into a series of operation carried out at separate successive and permanent points, points to the next may be by means of conveyor belt, trolleys and cranes etc.

### **11. Explain the Erection procedure of PFS building?**

- Before commencing erection, the setting out at the level concerned must be carefully checked with surveying instruments.
- At the same time, the working of cranes and the correct layout of the cranes track must be checked.

- Prefabricates buildings are erected in convenient section which correctly fixed, should be sufficiently rigid in all directions.

**12. What are the aims of prefabrication?**

- Prefabrication is used to affect economy in cost.
- This results in improvement in quality because components can be manufactured under controlled conditions.
- The spread of construction is increased since no curing period is necessary.

**13. What are the characteristics of Materials used for construction of PFS?**

- Easy availability.
- Light weight for easy handling and transport.
- Thermal insulation property.
- Easy workability.
- Durability in all weather conditions.
- Economy in cost.
- Sound insulation.

**14. What are the Advantages of standardization?**

- Easier design
- Easier manufacture
- Easier erection and completion

**15. What are the Factors influencing the standardization?**

- The most rational type of member for each element is selected from the point of production from the assembly serviceability and economy.
- The number of types of elements will be limited and they should be used in large quantities.

- To extent possible the largest size to be used which results in less number of joints.
- The size and the number of prefabricates is limited by the weight in overall dimension that can be handled by the transportation.

**16. Define prefabrication.**

Prefabrication is the practice of assembling components of a structure in a factory or other manufacturing site and transporting complete assembles to the construction site where the structure is to be located.

**17. Define the term Off-site fabrication.**

Off-site fabrication is the process that incorporates prefabrication and preassembles the process involves the design and manufacture of units usually remote from the work site and the installation at the site to form the permanent work at the site.

**18. List out the limitations of pre-fabrication?**

- Extra reinforcement is required to take care of handling and erection stresses.
- Temporary properties may be required in some cases, before the un-site concrete joints achieve strength.
- The cracks may develop at the joints between the precast in –site concrete due to shrinkage and temperature stresses.
- To overcome them extra steel is required across joint.

**19. What are all the Prefabrication materials?**

- Structural insulated panels (SIPs).
- Insulating concrete forms (ICFS).
- Prefab foundation system.
- Steel framing.
- Concrete framing.
- Large - modular system

## **20. Write Insulating concrete forms?**

Insulating concrete forms (ICE) are a prefab construction material consisting of hollow EPS foam blocks that are stacked and glued together on-site, creating the form that is filled with reinforcing bars and concrete.

## **21. Write short note on MC Concept.**

- The basic module is small in terms of add size in order to provide design flexibility, yet large enough to promote simplification in the component variation in sizes.
- Industry friendly features that not only for manufacturing but also the transportation and assembly requirements.
- Internationally accepted to support international market.

## **22. What are the types of prefabricated construction systems?**

- Open prefabricated system
- Partial prefabricated open system
- Full prefabricated open system
- Large panel prefabricated system

## **23. Define Insulating concrete forms**

Insulating concrete forms (ICE) are a prefab construction material consisting of hollow EPS foam blocks that are stacked and glued together on-site, creating the form that is filled with reinforcing bars and concrete.

## **24. Write short note on Principles of MC Concept ?**

The principle objective of implanting MC is to improve productivity through the reduction of wastages in the production, installation process, to improve quality in the construction industry and to encourage an open system.

## **25. Write down the application of prefabrication in precast concrete.**

- Pipes and Tanks
- Lintel beams
- Beams and Girders

- Building blocks
- Wall panels
- Manhole covers

**26. What are the materials can prefabricated structures be made of?**

- Concrete and Steel
- Timber
- Aluminium
- Lightweight and cellular concrete
- Ceramic Products
- Gravel, slag, Mortar, Cement, Water

**27. List out the precautions taken while erecting precast elements. (May/ June 2011)**

- i) Check crane access to the site and erection platform to prevent cranes or trucks damaging the concrete floor during access.
- ii) Obtain verification that the erection platform can support the erection loads.
- iii) Ensure the locating dowels and leveling shims are correctly located. Dowels rather than blocks should be used to restrain the base of face-lifted panels when they are being positioned.
- iv) Clear the site for truck and crane access ensuring room for crane outriggers, counterweight tail swing and boom swing and under hook and overhead obstructions.

**28. State any two principles of prefabricated structures. (Nov/Dec 2013)**

- i) The theory behind the method is that time and cost is saved if similar construction tasks can be grouped and assembly line techniques can be employed in prefabrication at a location where skilled labour is available, while congestion at the assembly site, which waste time, can be reduced.
- ii) The method finds application particularly where the structure is composed of repeating units or forms or where multiple copies of the same basic structure are being constructed.

**UNIT II - PREFABRICATED COMPONENTS**

**Behavior of structural components – Large panel constructions – Construction of roof and floor Slabs – Wall panels – Columns – Shear walls.**

## **PART – A**

### **1. What is Shear wall? (AUC Nov/Dec 2012 & 2013)**

These are simple type and these shear walls under forces and horizontal shear along its length are subjected to bending and shear. To resist these forces, the uniform distribution of steel along its length is used in simple shear walls.

### **2. What are the types of prefabricated structural components?(AUC Nov/Dec & May/June 2012)**

1. Based on the area (or) size of prefabricates.
2. Based on weight of prefabricates.
3. Based on the function.
4. Based on the shape.
5. Based on the material.

### **3. What is the classification of precast large panel? (AUC May /June2013)**

1. Cross wall system
2. Longitudinal wall system
3. Two-way system

### **4. What are types of Cross wall system?**

1. Longitudinal wall system
2. Homogeneous walls
3. Non-Homogeneous walls

### **5. What are the prefabricated structural units?**

1. Walls and columns
2. Lintels
3. Doors and window frames
4. Roofing and flooring elements
5. Stairs

### **6. What is meant by box type construction?**

In this system room size units are prefabricated and site. Toilet and kitchen blocks could also be similarly prefabricated and erected at site.

This system derives its stability and stiffness from the box units which are formed by four adjacent walls. Walls are jointed to make rigid connections among themselves. The box units rest on plinth foundation which be of conventional type



or precast.

### **7. Write briefly about Types of Wall Panels?**

The single way of classification of precast wall panel is based on their size or the materials of which they are made. They can be classified. According to size, as small and large, or as narrow vertical stirrups or as broad horizontal bands.

The material that are used for precast wall panel are bricks, hollow clay blocks, normal density concrete, light – weight metal, gypsum, plastic, and timber.

### **8. What is the classification of precast concrete walls?**

- ✓ Based on size
- ✓ Based on materials used
- ✓ Based on function
- ✓ Based on location
- ✓ Based on cross section
- ✓ Based on stressing

### **9. What are the types of precast floors?**

- Depending up on the composition of units, precast flooring units could be homogeneous or non-homogeneous.
- Homogeneous floors could be solid slabs, ribbed or waffle slabs.
- Non homogeneous floors could be multi layered ones with combinations of light weight concrete or reinforced / prestressed concrete with filler blocks.

### **10. Write about Prefabricated Roofing and flooring elements.**

- Prefabricated reinforced concrete battens and plain concrete tiles can be used for roofing and flooring for flat, instead of wooden section and brick tiles.
- For sloping roof, precast reinforced and prestressed concrete triangulation trusses can be used.
- Plain concrete or lightly reinforced concrete can be used in the form of precast shells for roofing.

### **11. Define Long Wall System?**

The main beam (or) load bearing wall are placed to the long axis of building. It is applied to the building with large prefabricated and similar to traditional

brickwork. The longitudinal wall crosses the floor load must possess not only thermal.

**12. How are roofing members in prefabricates classified?**

- ✓ Small roofing members.
- ✓ Large roofing members.
- ✓ Reinforced planks (or) ties.
- ✓ Light weight concrete roofing members.
- ✓ Small reinforced concrete roofing members.
- ✓ Purlins.

**13. What is the space bordering?**

These members are used to give spaces like walls both load carrying and partition walls. This may (or) may not contain doors and windows the provision for the same is as per the requirement. Another example for the space bordering member is floor slab.

**14. What is the meant by surface forming members?**

In the case of surface forming members, the load carrying and surface bordering are united and a uniform load carrying surface is found loaded by complex forces and economic shapes. Example: Shell structures folded plates structures etc.

**15. Differentiate between synclastic and Anticlastic?**

In the case the synclastic the curve of the shell in the same side (e.g.: hemispherical shell) whereas in the case of anticlastic the curvature of the shell is in opposite direction (e.g.: hyperbolic shell (saddle shell)).

**16. Write a short on dome structure?**

A dome is a space structure covering a more (or) less square (or) irregular area. The best known example is the dome of revolution, and it is one of the earliest of the shell structure. Excellent examples are still in existence that were built in Roman times.

**17. Different classification of shear walls.**

- ✓ Plain rectangular shear wall
- ✓ Bar bell type

- ✓ Framed shear wall
- ✓ Coupled shear wall
- ✓ Core type

**18. What is ring system?**

Load bearing walls and beams are placed in both ways longitudinally and transversely. In the building with ring system of support floors are normally supported on all four edges and span is two direction. In skeleton construction these floors are placed directly on columns.

**19. Give the classification of floor slabs.**

- Precast RB curved panel
- Precast RC channel roofing
- Precast hollow slabs
- L panel roofing
- Trapezon panel roofing
- Un reinforced pyramidal brick roof
- Precast concrete panel
- Precast RC Panels
- Prefabricated brick panels

**20. What is necessity of dimensional tolerances? (AUC May /June2013)**

- It is almost impossible (and sometimes uneconomical) to maintain the strict degree of accuracy as listed on a plan.
- To accommodate this, it is normal to display measurements with a plus or minus (+/-) tolerance which allows for some margin of error.
- Care needs to be taken however when determining such (+/-) tolerance, particularly where there are mating parts.

**21. What are the lateral loads in a building?**

- Live load
- Wind load
- Earthquake load

**22. What are the lateral load resisting elements in a building? (AUC Nov/Dec 2013)**

- Vertical Elements

1. Moment Resisting Frames
  2. Walls
  3. Bearing walls / Shear Walls / Structural Walls
  4. Gravity Frame + Walls
  5. “Dual” System (Frame + Wall)
  6. Vertical Truss
  7. Tube System
  8. Bundled
  9. Tube System
- Floor/Diaphragm
  - Foundation

**23. Define large panel systems.**

The designation “large-panel system” refers to multi-storey structures composed of large wall and floor concrete panels connected in the vertical and horizontal directions so that the wall panels enclose appropriate spaces for the rooms within a building. These panels form a box-like structure.

**24. Write the dimensional Tolerances. (May/June 2013)**

- Length : ( $\pm 20$  mm)
- Width (flanges and fillets): (+10 mm, -5 mm)
- Depth (Overall ) : (+12 mm, -5 mm)
- Width (Web): (+10 mm, -5 mm)
- Depth (flanges and fillets): ( $\pm 5$  mm)
- Bearing plates (Center to center): ( $\pm 12$  mm)

**25. Explain the term lift slab construction. (May/June 2012)**

Lift slab construction is a method of constructing concrete buildings by casting the floor or roof slab on top of the previous slab and then raising (jacking) the slab up with hydraulic jacks, so being cheaper and faster as not requiring boxing and supports for casting in situ.

**26. Give the classification of wall panels. (May/June 2009)**

- Cellular unit
- Hollow concrete block masonry unit

- Soil-cement block units.
- Fly ash bricks
- Lime soil blocks
- RCC panels

**27. What are the tests involved in prefabricated components?**

**Testing on individual Components**

- ✓ Strength Tests Load Test.
- ✓ Rebound Hammer.
- ✓ Ultrasonic Pulse Velocity Measurement.
- ✓ Pull-out methods.

**UNIT III - DESIGN PRINCIPLES**

**Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.**

**PART - A**

**1. Write the types of precast joints.**

- Compressive
- Tensile joint
- Shear joint
- Flexural and torsion joint

**2. At what points disuniting of structures should be done?**

Disuniting can be done at corners or points of minimum moments to make the hoisting of these smaller members possible using simpler equipments.

**3. How the material used in construction does affect the design of the elements?**

- In the production of prefabricated structures we can have strict quality control, so we can utilize the entire strength of materials with minimum factor of safety.
- It will lead to economical design and dimension of structures. But while design allowance should be given for the stresses developed during handling the members.

**4. What is the key process of precast construction?**

- Design process
- Production process
- Storage and delivery
- Site erection

**5. What are the considerations of precast construction?**

- Planning
- Sequencing of precast erection

**6. Distinguish between site prefabrication and plant prefabrication. Site prefabrication**

- The size limitation is depending on the elevation capacity only.
- Lower quality because directly affected by weather.
- Proper large free space required.

**Plant prefabrication**

- Transportation and elevation capacity limits the size.
- Higher, industrialized quality – less affected by weather.
- No space requirement on the site for fabrication.

**7. Explain briefly the disuniting of structures. (May/June 2013)/ (Nov/Dec 2013)**

In prefabrication many elements of prefabricated are assembled or united or joined to form a single structure. The problem in prefabrication is the transportation. To avoid this problem of transportation the structure is disuniting or separated into smaller or elements, so that the transportation becomes very easy.

**8. Write the advantages of disuniting structures? (Nov/Dec 2012)**

- ✓ Number of joints is reduced.
- ✓ Failure at joints is minimum.
- ✓ Disuniting method is suitable for site prefabrication.
- ✓ Transportation cost for many elements to the site is reduced.

**9. Write the disadvantages of disuniting of structures?**

- ✓ Lifting or hoisting of the entire frames is more difficult.
- ✓ Transportation or frame from the plant is difficult.
- ✓ Transport cost is high for the transport of entire frame.
- ✓ Stress distribution during lifting is a problem.

**10. How can we classify the prefabrications principles?**

Prefabricates are classified as homogenous and composite based on the number of different material used in fabrication.

**11. Mention the design of C/S in prefabrication?**

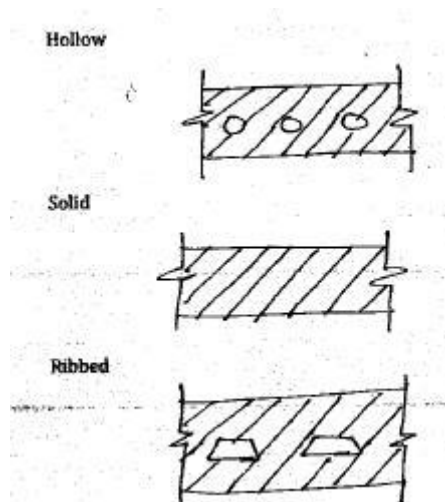
The c/s of precast reinforced concrete structure is normally having the following

Tee section, I Section, U or V section

**12. Write the classifications of homogenous prefabrication?**

The homogenous unit may be classified into 3 year

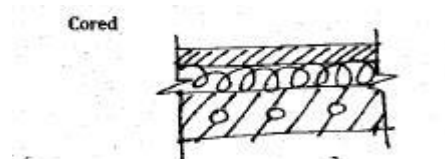
- Hollow
- Solid
- Ribbed

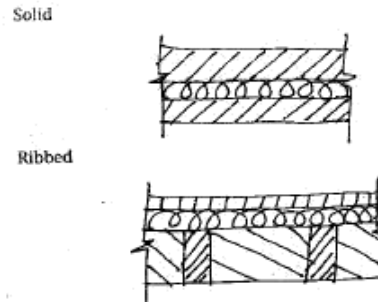


**13. Write the classification of composite prefabrication.**

The composite unit may be classified into 3 types

- Cored
- Solid
- Ribbed





**14. How does the material used in construction affect the design of the element? (May/June 2009)**

The materials for the construction are classified as homogeneous and composite based on the number of different material used in prefabrication.

**15. Explain joint deformation? (May/June 2009)/ (May/June 2012)**

Various structural elements are made in the plant or prefabricated when these elements in their site there may be joint deformation to take it workout deformation.

**16. Mention some important requirements of the joint flexibility. (May/June 2013)**

- The construction of joint should be easy.
- The joint should require little material.
- Joint should not consume more labour.
- Less labour is to be required.
- The cost should be minimum.

**17. Distinguish between rigid joint and hinged joint with reference to prefabricated construction. (May/June 2013)**

- The rigid joints are of adequate (sufficient) strength, in addition to bearing of tensile, compressive and shear force and for resisting bending moment.
- The hinge joint is those which can transmit force passing through the hinge itself allow sudden motion and rotation.

**18. Write the system consisting of linear member disunited at joint.**

Disunity at joint gives the linear member, this means a great advantages and facility from the view point of both manufacture and assembly. Using this system,



auxiliary scaffolding is not necessary and the hoisting process is as a rule very simple.

**19. Explain joint flexibility. (May/June 2013)/ (Nov/Dec 2013)**

A joint that holds two parts together so that one can swing relative to the other is called joint flexibility.

**20. List the disadvantages of precast construction. (April/May 2011)**

- Very heavy members.
- Camber in beams and slabs.
- Very small margin for error.
- Connections may be difficult.
- Somewhat limited building design flexibility.

**UNIT IV - JOINT IN STRUCTURAL MEMBERS Joints  
for different structural connections – Dimensions and detailing – Design of  
expansion joints**

**PART – A**

**1. What are the importances of joints in precast structures when compared to cast in situ structures?**

In cast in situ structures the joints are provided to relieve the stresses due to temperature and shrinkage and also to accommodate the construction sequence for placement of concrete. But in case of precast structures apart from the above reason we require joints to connect various elements of structures.

**2. What is the need for expansion joint in precast structures? (May/June 2012)**

- Expansion joints are necessary in precast structures in order to allow for the expansion and cooling of various members due changing in temperature. In precast structures the shrinkage takes place before the assembling of members, therefore the spacing of expansion joints may be 1.5 to 2 times greater than in monolithic structures.
- Expansion joints are usually formed at the joint of roofing members and main girders.

**3. What are connections? (May/June 2012)**

In precast members to overcome operational difficulties the member are disunited into smaller elements. Connections are used to get required structures by joining the separate smaller elements.

**4. What are the different types of connections?**

There are two types of connections

- Wet connections (with mortar or in situ concrete)
- Dry connections (with welding and bolting)

**5. What are the points to be considered while designing the connections?**

- Loading under working condition
- Stability of structures
- Load conditions during construction
- Effect of shrinkage, creep and temperature
- Unequal settlements

**6. What are the different connections made in prefabricated structures?**

- Column to column connections
- Beam to beam connections
- Main beam to secondary beam connections

**7. What are the different types of joints? (NOV/DEC 2013)**

- Expansion joints
- Contraction joints
- Crack control joints
- Construction joints

**8. What are the materials used for concrete joints?**

- Flexible board
- Dowels
- Sealants

**9. Based on location with in a building how connections can be classified?**

Based on location within a building connections are classified into vertical and horizontal joints

- Vertical joints connect the vertical faces of adjoining wall panels and primarily resist vertical seismic shear forces
- Horizontal joints connect the horizontal faces of the adjoining wall and floor panels and resist both gravity and seismic loads

**10. What are the functions or importance of joints? (May / June 2009)**

Joints between internal and external wall panels shall be designed to resist the forces acting on them without excessive deformation and cracking. They shall also be able to accommodate the deviations in the dimensions of the wall panels during production and erections.

**11. Define joint. (May/June 2012)**

- It is desirable for the structure should be load bearing as soon as possible , preferably , immediately after assembly.
- In additional demand is that the joint should require only a little material and a should not be labour observing (i.e.) cost should be minimum

**12. What are the requirements of joints? (May/June 2009, 2012)**

- The forming and construction of joints requires greatly increased control.
- The design and construction of joints should normalize with the materials to be used
- Joints must be designed and executed to ensure dimensioned tolerance
- A relative displacement of the joint member should be impossible

**13. Write the types/classification of joints (May/June 2013)**

**a) As per dimensional tolerance :**

- i) Butt joint
- ii) Splayed joint
- iii) Pin joint

**b) As per functions:**

- i) Rigid joint

ii) Hinge like joint

iii) Shod joint

**c) As depending on necessity of in-situ concreting :**

i) Dry joint

ii) Wet joint

**14. What is the significance of connections in precast constructions? (April/May 2011)**

Loading under working condition

Stability of structures

Load conditions during construction

Effect of shrinkage, creep and temperature

Unequal settlements

**15. What is meant by expansion joints? (May/June 2013)**

Expansion joints allow expansion and contraction of a member without generating potentially damaging forces within the member itself or the surrounding structures.

**16. State post tensioned connections. (Nov/Dec 2013)**

Post tensioned connections can generally be joined for simpler than the usual reinforced concrete structures. In post tensioned structures the forming of joints does not cause difficulties. In this all the joints are course rigid and moment bearing.

**17. List the advantages of column to column connection.**

- This connection provides good accessibility for proper welding.
- This connection leads to fastest possible erection.
- This connection provides good corrosion production.

**18. What is meant by chambers?**

Square edges of all precast elements are liable to spalling or chipping and also causes accidents while handling and erection. For this reasons these edges should be chamfered, with the size of 15mm x 15 mm as maximum.

**19. What are the factors to be considered while choosing a connection?**

- Structural requirement

- Tolerances
- Aesthetical requirements
- Mode of erection
- Finishing requirements
- Transportation and storage

**20. List the advantages of main beam to secondary beam connection.**

- No insitu concrete is required
- Maintenance cost is nil
- This connection is able to transmit fairly large vertical force as well as horizontal forces
- This connection leads to fastest possible erection

**UNIT V DESIGN FOR ABNORMAL LOADS**

**Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.**

**PART A (TWO MARKS)**

**1. Define Progressive Collapse. (May/June 2012)/ (Nov/Dec 2013)**

Progressive Collapse occurs when the sudden loss of a critical load bearing element initiates a chain reaction of structural element failures, eventually resulting in partial or full collapse of the structure.

**2. What are the approaches to avoid progressive collapse? (Nov/Dec 2012)**

- Redundancy or alternate load path
- Local Resistance
- Interconnection or Continuity.

**3. What are the reinforced concrete design requirements?**

- Material properties for reinforced concrete
- Strength reduction factor for reinforced concrete tie forces.
- Proportioning of ties
- Continuity and anchorage of ties
- Internal ties
- Peripheral ties

- Horizontal ties to external columns and walls
- Vertical ties
- Elements with deficient vertical design tie strengths

#### **4. Define Degree of Progressivity**

It is defined as the ratio of total collapse area or volume to the area or volume damaged directly by the triggering event.

#### **5. List the codes and standards for progressive collapse. (Nov/Dec 2013)**

1. ASCE7-02
2. ACI 318-02
3. GSA PBS facilities and standards 2000
4. GSA PBS facilities and standards 2003
5. GSA PBS progressive collapse guidelines 2003

#### **6. How to achieve structural integrity in a structure?**

- Connections between structural components should be ductile.
- Good plan layout
- Providing an integrated system of ties among the principal elements of the structural system.
- By changing the direction of span of floor slab.

#### **7. Write the assumptions for the dynamic analysis procedure.**

- The structure is modeled as two dimensional
- Effects of large deflections are neglected
- Elastic perfectly plastic moment rotation relationships are used.
- Equivalent structural damping of 5% is assumed throughout the analysis.
- All beam to column connections are moment resistant and are stronger than the beams. So plastic hinges will form in the body and not in the column or in the joint (Strong column weak beam principles)
- All beams are adequately confined by shear reinforcement so that beams are not shear controlled.
- Columns have adequate strength to resist additional load redistribution due to loss of the primary columns.

#### **8. What are the special requirements for building in High seismic zones?**

- Large panel building in high seismic zones are recommended to be constructed with closed symmetrical layout.
- The height of the building shall generally restricted 10 storey's in zone IV and 7 storey's in Zone V.
- The vertical and horizontal joints for wall panels shall be designed as keyed joints.

**9. What are the requirements to increase the resistance to progressive collapse?**

- All the multistory vertical load carrying elements must be capable of supporting the vertical load after the loss of lateral support at any floor level (i.e. a laterally unsupported length equal to two stories must be used in the design or analysis). The loads from the "removed" storey need not be applied to the wall or column.
- All floors and roofs must be able to withstand a prescribed net upward load applied to each bay. The uplift loads are not applied concurrently to all bays. For medium and high level of protection.
- All perimeter columns must have sufficient shear capacity to develop the full plastic flexural moment.

**10. What are the provisions made in prefabricated RC floors in a cyclone prone Zone?**

- Prefabricated RC elements of various designs placed side by side where as RC slabs are rigid in their own planes, the other types will require their integration through diagonal bracing or topping RC screed. (Structural deck concrete)
- Structural deck concrete of grade not leaner than M20 should be provided over precast components to act monolithic with them.

**11. What are the advantages of design of progressive collapse in structures?**

**Provides enhanced accurate analysis because:**

- Plastic hinges are not assumed; they are automatically calculated and generated without any user intervention.
- Collapse areas are not assumed; rather when a plastic hinge fails the solver automatically separates the section that fails allowing it to behave naturally

within the collapse scenario.

**Quick & Easy Modeling:**

- Automatic mesh adjustments
- Automatic spring generation
- Data exchange available with several FEM and BIM software applications.

**12. What are the features of progressive collapse?**

- Structural components can be removed either simultaneously or at custom intervals.
- Analysis is performed automatically within the solver. Gravity analysis is provided by default with non-linear dynamic analysis to simulate the accumulated effects of progressive collapse without any user intervention.
- Through the true modeling of structural components, “catenary action” and other structural responses are taken into account.
- Users can truly understand the cause and how the structure collapses because ELS allows them to witness the entire duration of the collapse process, verify which part(s) of the structure will collapse and predict the effects of falling debris on adjacent structures.

**13. What is meant by progressive collapse analysis?**

Extreme loading for structures (ELS) software allows structural engineers to accurately analyze and visualize progressive (disproportionate) collapse resulting from extreme loading conditions including: earthquake loads, severe wind loads, blast loads, dynamic loads and impact loads.

Engineers can also determine a structures vulnerability to progressive collapse by creating multiple event scenarios which will stimulate the failure of different components so as to determine whether the resulting collapse will be partial or complete.

**14. What are the types of collapse in prograssive structural elements?**

This is a form of “domino effect” failure that can occur in a reinforced concrete structure whereby a failure starting in a particular component rapidly propagates to other components precipitating a major or even a total collapse.



The three most common occurrences of this type of collapse are as follows

1. High rise concrete flat-plates structures (during construction or earthquake)
2. Formwork for concrete structures.
3. High rise structures constructed with precast concrete elements.

#### **15. Define Equivalent static analysis.**

- This approach defines a series of forces acting on a building to represent the effects of earthquake ground motion, typically defined by a seismic design response spectrum. It assumes that the building responds in its fundamental mode.
- For this to be true, the building must be low-rise and must not twist significantly when the ground moves. The response is read from a design response spectrum, given the natural frequency of the building (either calculated or defined by the building code).
- The applicability of this method is extended in many building codes by applying factors to account for higher buildings with some higher modes and for low levels of twisting.
- To account for effects due to “yielding” of the structure, many codes apply modification factors that reduce the design forces (e.g force reduction factors)

#### **16. Define Response spectrum analysis.**

This approach permits the multiple modes of response of a building to be taken into account (in the frequency domain). This is required in many building codes for all except for very simple or very complex structures. The response of a structure can be defined as a combination of many special shapes (modes) that in a vibrating string correspond to the “harmonics”.

Computer analysis can be used to determine these modes for a structure. For each mode, a response is read from the design spectrum, based on the modal frequency and the modal mass and they are then combined to provide an estimate of the total response of the structure. In this we have to calculate the magnitude of forces in all directions i.e, X, Y & Z and then see the effects on the building. Combination methods include the following:

- Absolute- peak values are added together

- Square root of the sum of the squares (SRSS)
- Complete quadratic combination (CQC) – a method that is an improvement on SRSS for closely spaced modes.

**17. Define linear dynamic analysis.**

Static procedures are appropriate when higher mode effects are not significant. This is generally true for short, regular buildings. Therefore, for tall buildings, buildings with torsional irregularities, or non-orthogonal systems, a dynamic procedure is required. In the linear dynamic procedure, the building is modelled as MDOF system with a linear elastic stiffness matrix and an equivalent viscous damping matrix.

**18. Define non-linear dynamic analysis.**

Nonlinear static procedures use equivalent SDOF structural models and represent seismic ground motion with response spectra. Story drifts and component actions are related subsequently to the global demand parameter by the pushover or capacity curves that are the basis of the non-linear static procedures.

**19. Explain the importance factor and response reduction factor used in static analysis for calculation of design seismic force. (May/June 2009)**

The importance factor originated with the seismic base shear equation in the 1976 Uniform Building Code (UBC). The concept at that time was that the importance factor increased the design seismic forces in order to provide additional seismic resistance to prevent catastrophic collapse.

The American society of Civil Engineer's minimum design loads for buildings and other structures (ASCE 7-98), the importance factor appears in the velocity pressure equation for wind design and in the flat roof snow load equation for snow load design. There are three different importance factors: wind, snow and seismic.

**20. Define the term abnormal loads.**

Loads other than conventional design loads (dead, live, wind and seismic) for structures such as air blast pressures generated by an explosion or impact by vehicles etc.,

**21. What are the causes of abnormal loads? (Nov/Dec 2012)**

- Accidental impact
- Faulty construction
- Foundation failure
- Violent changes in air pressure

**22. What is meant by allowable extent of collapse?**

The extent of damage resulting from the loss in support of an exterior primary vertical load-bearing member that extends one floor above grade (one story) shall be limited.

**23. Define the term connection redundancy and connection resilience. connection redundancy**

A beam to column connection that provides direct, multiple load paths through the connection.

**connection resilience**

A beam to column connection exhibiting the ability to withstand rigorous and destructive loading conditions that accompany a column removal, without rupture. This ability is facilitated by the connection's torsional and weak axis flexural strength, its robustness and its primary use of proven ductile properties of a given construction material.

**24. Mention the term high potential for progressive collapse.**

The facility is considered to have a high potential for progressive collapse if analysis results indicate that the structural members and/or connections are not in compliance with the appropriate progressive collapse analysis acceptance criteria.

**25. Mention the term low potential for progressive collapse.**

The facility is considered to have a low potential for progressive collapse if analysis results indicate that the structural members and/or connections are in compliance with the appropriate progressive collapse acceptance criteria. Such facilities be exempt from any further consideration of progressive collapse.

**26. Define the term equivalent design loads. (May/June 2012)/ (May/June 2013)**

In the arrangement the bearing is subjected to generally acting forces in various magnitudes, at various rotational speeds and with different acting period. From the point of view of calculation methodology the acting forces should be

recalculated into the constant load, by which the bearing will have the same life as it reaches in the conditions of the actual load. Such a recalculated constant radial or axial load is called the equivalent load.

**27. What is strong column and weak beam concept? (May/June 2012)**

- In a building a column is more important than a beam, because it supports the load till the foundation. If a beam breaks it will result in a partial collapse but if a column breaks it will result in catastrophic failure.
- That is the reason why we have to always design our columns stronger than beams.

**CE6016 - PREFABRICATED STRUCTURES PART – B (16 MARKS) UNIT**

**I INTRODUCTION**

1. Discuss with sketches the concept of disuniting of structures in prefabrication.
2. Explain with sketches the cross sections of beams and columns used in precast construction.
3. How will you eliminate handling stresses while hoisting precast members?
4. Explain the different stages in construction prefabricating structures
5. Explain with the case study the problems arising due to improper handling of materials in prefabrication structures.
6. Explain in detail about IS codal provision for prefabricated structures
7. Explain in detail with sketches the prefabrication system and their relative merits and field of application
8. Discuss in detail the various equipments used in the erection of prefabricated system
9. Explain in detail about the need for prefabrication with merits and demerits
10. Explain the need of modular coordination and standardization of prefabricated structures in detail

**UNIT II PREFABRICATED COMPONENTS**

1. Discuss the different reinforced concrete wall panels used in prefabricated construction.
2. With a neat sketch, explain an expansion joint used in precast construction.
3. Explain the merits and demerits of expansion joints?
4. What are the requirements of ideal structural joint? Explain different joints?
5. Explain with neat sketch about beam to column and column to foundation connection?
6. Explain the joint techniques and materials used for expansion joints in detail?
7. What are the essential requirements of joints in precast construction?
8. Explain in detail about long and cross wall large panel building
9. Explain one way and two way prefabricated slabs
10. Explain framed buildings with partial and curtain walls.

### **UNIT III DESIGN PRINCIPLES**

1. Explain the behavior of roof and floor slabs.
2. Explain in detail the manufacture of roof slabs. Also explain the precautions taken during the manufacturing process.
3. What are the recommendations for the design of staircase slab?
4. Give the requirements of insulation in roof slabs.
5. What are the reinforcement requirements of joints in precast construction?
6. Explain about Roofing members in detail.
7. Write the design procedure for cored and panel types of floor slabs.
8. Explain the types of joints in precast construction. Also explain its behavior.
9. Explain the design of two way systems in floor slabs.
10. Explain the methods of construction of roof and floor slabs.

### **UNIT IV JOINT IN STRUCTURAL MEMBERS**

1. Write in detail about connections and joints for wall panels
2. Brief manufacture, transport and erection of wall panels

3. Write the structural design of load bearing wall panels
4. Write the structural design of curtain wall
5. Explain the stability of wall panels
6. What are the steps involved in the design of shear walls
7. Specify the general consideration for external wall construction
8. Explain about load transfer in wall panels

#### **UNIT V DESIGN FOR ABNORMAL LOADS**

1. Write in detail about precasting methods
2. Briefly explain about the item of work done in erection
3. Design requirements and consideration of prefab joints
4. Write in detail about installation of prefabricated elements
5. What are the design requirements of precast truss?
6. Explain about hyper prefabricated shells
7. Design principles of wind bracing
8. Design criteria for precast L panels
9. Design requirements for precast structural planks
10. Design requirements for doubly curved shell units.

# **CE 6021 – REPAIR AND REHABILITATION OF STRUCTURES**

## **TWO MARK QUESTIONS AND ANSWERS**

### **UNIT I MAINTENANCE AND REPAIR STRATEGIES**

#### **1. Define Maintenance.**

Maintenance is the act of keeping something in good condition by checking or repairing it regularly. The work done to keep the civil engineering structures and work in a condition so as to enable them to carry out the functions for which they are constructed.

#### **2. Define Repair.**

Repair is the process of restoring something that is damaged or deteriorated or broken, to good condition.

#### **3. Define Rehabilitation.**

Rehabilitation is the process of returning a building or an area to its previous good conditions.

#### **4. What are the two facets of maintenance? The**

two facets of maintenance are

- a) Prevention
- b) Repair

#### **5. What are the causes of deterioration?**

- a) Deterioration due to corrosion
- b) Environmental effects
- c) Poor quality material used
- d) Quality of supervision
- e) Design and construction flaws

#### **6. Define physical inspection of damaged structure.**

Some of the useful information may be obtained from the physical inspection of damaged structure, like nature of distress, type of distress, extent damage and its classification etc, their causes preparing and documenting the damages, collecting the samples for laboratory testing and analysis, planning for in situ testing, special environmental effects which have not been considered at the design stage and information on the loads acting on the existing structure at the time of damage may be, obtained. To stop further damages, preventive measure necessary may be planned which may warrant urgent execution.

**7. How deterioration occurs due to corrosion?**

- Spalling of concrete cover
- Cracks parallel to the reinforcement
- Spalling at edges
- Swelling of concrete
- Dislocation
- Internal cracking and reduction in area of steel reinforcement.

**8. What are the steps in selecting a repair procedure? o**

Consider total cost

- o Do repair job in time
- o If defects are few & isolated repair on an individual basis. Otherwise do in generalized manner
- o Ensure the repair prevents further development of defects
- o In case of lost strength, repairs should restore the strength
- o If appearance is a problem, the number of applicable types of repairs become limited & the repairs must be covered
- o Repair works should not interface with facilities of the structure

**9. Discuss about the environment effects which leads to deterioration of concrete structure.**



Micro-cracks present in the concrete are the sources of ingress of moistures atmospheric carbon di-oxide into the concrete which attack reinforcement and with various ingredients of concrete. In aggressive environme4nt concrete structure will be severely reduces.

**10. What is the effect of selecting poor quality material for construction?**

Quality of materials, to be used in construction, should be ensured by means various tests as specified in the IS codes. Alkali-aggregate reaction and sulphate attack results in early deterioration. Clayey materials in the fine aggregates weaken the mortar aggregate bond and reduce the strength. Salinity causes corrosion of reinforcing bars as well as deterioration of concrete.

**11. How can we determine the cause for deterioration of concrete structure?**

- a) Inspect & observe the structure
- b) Observe in bad & good weather
- c) Compare with other constructions on the area or elsewhere & be patient
- d) Study the problem & allow enough time to do the job

**12. What are the factors to be considered by the designer at the construction site?**

- Minimum and maximum temperatures
- Temperature cycles
- Exposure to ultra violet radiation
- Amount of moisture
- Wet/dry cycles
- Presence of aggressive chemicals

**13. What are the steps in repair aspect?**

- a) Finding the deterioration
- b) Determining the cause
- c) Evaluating the strength of existing building or structure
- d) Evaluating the need of repair
- e) Selecting & implementing a repair procedure

**14. Define the fixed percentage method of evaluating the strength of existing structure.**

It is to assume that all members which have lost less than some predetermined % of their strength are still adequate and that all members which have lost more than the strength are inadequate. It is usually from 15% onwards higher values are applicable for piling % stiffness bearing plates etc.

**15. Discuss about the design and construction errors leading to deterioration of a structure.**

Design of concrete structures governs the performance of concrete structures. Well designed and detailed concrete structure will show less deterioration in comparison with poorly designed and detailed concrete, in the similar condition. The beam-column joints are particularly prone to defective concrete, if detailing and placing of reinforcement is not done properly. Inadequate concrete cover may lead to carbonation depth reaching up to the reinforcement, thus, increasing the risk of corrosion of the reinforcement.

**16. Discuss about the quality of supervision to be followed at a site.** Construction work

should be carried out as per the laid down specification.

Adherence to specified water-cement ratio controls strength, permeability durability of concrete. Insufficient vibration may result in porous and honey combined concrete, whereas excess vibration may cause segregation.

**17. What are the possible decisions that can be made after evaluating the strength of a structure?**

- i. to permit deterioration to continue
- ii. to make measures to preserve the structure in its present condition without strengthening
- iii. to strengthen the construction
- iv. if deterioration is exceptionally sever, to reconstruct or possibly abandon it.

**18. How can we evaluate the strength of existing structure by stress analysis?**

This method is to make detailed stress analysis of the structure, as it stands including allowances for loss of section where it has occurred. This is more difficult & expensive. Here also the first step is to make preliminary analysis by fixed percentage method and if it appears that major repairs will be required, the strength is reevaluated based on detailed stress analysis, considering all contributions to such strength.

**19. Define the load test method of evaluating the strength of existing structure.**

Load tests may be required by the local building offered, but they should only be performed where computation indicated that there is reasonable margin of safety against collapse, lest the test bring the structure down. Load test show strengths much greater than computed strengths when performed on actual structures. When performed on actual structures. In repair work every little bit of strength is important.

**20. What are the possible decisions after finding a structure to be inadequate?**

- i. if the appearance of the existing condition is objectionable – repair now
- ii. if appearance is not a problem then Put the condition under observation to check if it is dormant or progressive.
- iii. if dormant – no repair
- iv. if progressive – check the feasibility & relative economics of permitting deterioration to continue and performing a repair at some later date & of making the repair right away

**UNIT II**

**STRENGTH AND DURABILITY OF CONCRETE**

**1. How can use prevent the effect of freezing and thawing in concrete?** Concrete can be restricted from frost action, damage of the structure by the entrainment of air. This entrainment of air is distributed through the cement paste with spacing between bubbles of no more than about 0.4mm.

**2. Write any two tests for assessment of frost damage?**

The frost damage can be assessed by several ways:

- i) Assessment of loss of weight of a sample of concrete subjected to a certain number of cycles of freezing and thawing is one of the methods
- ii) Measuring the change in the ultrasonic pulse velocity or the damage in the change in the dynamic modulus of elasticity of specimen is another method.

### **3. How does a concrete structure get affected by heat? Heat**

may affect concrete and as a result of:-

- i. the removal of evaporable water
- ii. the removal of combined water
- iii. alteration of cement paste
- iv. alteration of aggregate
- v. change of the bond between aggregate and paste

### **4. How can you control cracks in a structure?**

- Use of good coarse aggregates free from clay lumps
- Use of fine aggregate free from silt, mud & organic constituent.
- Use of sound cement.
- Provision of expansion & contraction joint.
- Provide less water-cement ratio.

### **5. Define aggregate splitting?**

This phenomenon occurs most frequently when hard aggregates are used in concrete. The thermal stresses except close to corners are predominantly compressive near to the heated surface. This stress causes the aggregate to split in this direction and the fractures may propagate through the mortar matrix leading to deterioration.

### **6. What are the factors affecting chemical attack on concrete?**

- High porosity
- Improper choice of cement type for the conditions of exposure
- Inadequate curing prior to exposure
- Exposure to alternate cycles of wetting and drying

### **7. Write the methods of corrosion protection?**

- Corrosion inhibitors
- Corrosion resisting steels
- Coatings for steel
- Cathodic protection

### **8. List out some coatings for reinforcement to prevent corrosion?**

- Organic coating
- Epoxy coating
- Metallic coating
- Zinc coating

### **9. Define corner repair?**

This is a very common occurrence and appears to be due to a component of tensile stress causing splitting across a corner. In fire tests, corner separation occurs most often in beams and columns made of Quartz aggregate and only infrequently with light weight aggregates.

**10. List any four causes of cracks?**

- Use of unsound material
- Poor & bad workmanship
- Use of high water-cement ratio
- Freezing & thawing
- Thermal effects & Shrinkage stresses

**11. What are the types of cracks?**

- Class-1: Cracks leading to structural failure
- Class-2: Cracks causing corrosion
- Class-3: Cracks affecting function
- Class-4: Cracks affecting appearance

**12. What changes occur, when hot rolled steel is heated to 500°C?**

At temp of 500°C-600°C the yield stress is reduced to the order of the working stress and the elastic modulus is reduced by one-third. Bars heated to this temp virtually recover their normal temperature.

**13. List out the various types of spalling.**

- i) General or destructive spalling
- ii) Local spalling which is subdivided as
  - aggregate splitting
  - corner separations
  - surface spalling
  - Sloughing off

**14. List some faults in construction planning?**

- Overloading of members by construction loads
- Loading of partially constructed members
- Differential shrinkage between sections of construction
- Omission of designed movement joints

**15. Define corrosion?**

The gradual deterioration of concrete by chemically aggressive agent is called “corrosion”

**16. Give some examples for corrosion inhibitors?**

- a) Anodic inhibitors
- b) Cathodic inhibitors
- c) Mixed inhibitors
- d) Dangerous & safe inhibitors

**17. Define effective cover?**

The cover to reinforcement measured from centre of the main reinforcement up to the surface of concrete in tension is called “Effective cover”

**18. Define corrosion inhibitor?**

Corrosion inhibitor is an admixture that is used in concrete to prevent the metal embedded in concrete from corroding.

**19. What are the operations in quality assurance system?**

- Feed back
- Auditing
- Review line
- Organization

**20. List the various components of quality control.**

Five components of a quality (control) assurance system are: Standards

- Production control
- Compliance control
- Task and responsibilities Guarantees for users

**UNIT III**

**SPECIAL CONCRETES**

**1. List the various types of polymer concrete.**

- i) Polymer impregnated concrete (PIC)
- ii) Polymer cement concrete (PCC)
- iii) Polymer Concrete (PC)
- iv) Partially impregnated and surface coat
- v) Polymer Concrete.
- vi) Polymer impregnated concrete (PIC)

**2. Give the various monomers used in polymer concrete.**

- Methylmethacrylate (MINS)
- Styretoc

- Acrylonitrile
- t-butyl styrene

### **3. Define polymer concrete.**

Polymer concrete is a aggregate bound a polymer binder instead of Portland cement as in conventional concrete pc is normally use to minimize voids volume in aggregate mars. This can be achieve by properly grading and mixing of a to attain the max density and (mixing) the aggregates to attain (maximum) minimum void volume. The entrapped aggregated are prepacked and vibrated in a mould.

### **4. What are the uses of Polymer concrete?**

During curing Portland cement form mineral voids. Water can be entrapped in these voids which are freezing can readily attack the concrete. Also alkaline Portland cement is easily attached by chemically aggressive materials which results in rapid determination, there as using polymers can compact chemical attack.

### **5. What is sulphur infiltrated concrete?**

New types of composition have been produced by the recently developed techniques of impregnating porous material like concrete with sulphur. Sulphur impregnation has shown great improvement in strength.

### **6. What are the applications of sulphur infiltrated concrete?**

Sulphur – (impregnated) infiltration can be employed in the precast industries. Sulphur infiltration concrete should found considerable use in industry situation where high corrosion resistant concrete is required. This method cannot be conveniently applied to cast- in place concrete Sulphur impregnation has shown area improvement in strength.

### **7. What is Vacuum concrete?**

Only about half of the water added in concrete goes into chemical combination and the remaining water is used to make concrete workable. After laying concrete, water which was making concreting workable is extracted by a special method known as “vacuum method”.

### **8. What are the equipments used in vacuum concrete?**

The equipment essentially consists of:-

- i. vacuum pump
- ii. water separator and
- iii. filtering mat

### **9. What is meant by fiber Reinforced concrete?**

The fiber reinforced concrete can be defined as composite material consisting of mixture of cement mortar or concrete and discontinuous. Described uniformly dispersed suitable fibbers, continuous mesh.

### **10. What are types of fibres used in fiber reinforced concrete?**

- The fibers that could be used are steel fiber, poly propylene, nylon, Asbestos, Glass and carbon.
- Fiber is a small piece of reinforcing material possessing certain characteristic properties.
- Steel fiber is one of the most commonly used fibre generally round fibre are used the dia varies from 0.25 to 0.75mm.
- The steel fiber is likely to get rusted and lose of its strength.
- Use of steel fiber makes significant improvement in flexural, impact and fatigue strength of concrete.

### **11. What are the Factors affecting fibre reinforced concrete?**

- Transfer of stress between matrix and fibre.
- Types of fibres.
- Fibre geometry.
- Fibre content.
- Distribution of fibre mixing.

### **12. Define High-performance concrete.**

High-performance concrete is a term used to describe concrete with special properties not attributed to normal concrete. High-performance means that the concrete has one or more of the following properties: low shrinkage, low permeability, a high modulus of elasticity, or high strength.

### **13. What is meant by High performance concrete?**

High performance concrete is a concrete mixture, which possess high durability and high strength when compared to conventional concrete. This concrete contains one or more of cementitious materials such as fly ash, Silica fume or ground granulated blast furnace slag and usually a super plasticizer.

### **14. What is meant by self compacting concrete?**



Self-compacting concrete (SCC) is a flowing concrete mixture that is able to consolidate under its own weight. The highly fluid nature of SCC makes it suitable for placing in difficult conditions and in sections with congested reinforcement.

**15. What is meant by geopolymer concrete?**

**Geopolymer concrete** is a type of **concrete** that is made by reacting aluminate and silicate bearing materials with a caustic activator. Commonly, waste materials such as flyash or slag from iron and metal production are used, which helps lead to a cleaner environment.

**16. What is meant by Reactive powder concrete?**

**Reactive powder concrete** is a relatively new cementitious material. Its main features include a high percentage ingredient of Portland cement, very low water-to-binder (cement + silica fume) ratio, a high dosage of super-plasticizer and the presence of very fine crushed quartz and silica fume.

**UNIT IV**

**TECHNIQUES FOR REPAIR AND PROTECTION METHODS**

**1. Define grouting.**

Grouting can be performed in a similar manner as the injection of an epoxy. However the use of an epoxy is the better solution except where considerations for the resistance of cold weather prevent such use in which case grouting is the comparable alternative.

**2. What are protective surface coatings?**

During of concrete can be substantially improved by preventive maintenance in the form of weather proofing surface treatments. These treatments are used to seal the concrete surface ad to inhibit the intrusion of moisture or chemicals.

**3. List some materials used as protective surface coatings.**

Materials used for this purpose include oils such as linseed oils, petroleum etc.

**4. Define dry pack.**

Dry packing is the hand placement of a very dry mortar and subsequent tamping or ramming of the mortar into place producing an intimate contact between the old and new concrete work.

**5. Give a brief account on routing and sealing.**

This method involves enlarging the cracks along its exposed surface, filling and finally sealing it with a suitable material. This is the simplest and most common technique for sealing cracks and is applicable for sealing both fine pattern cracks and larger isolated.

**6. Define external stressing.**

Development of cracking in concrete is due to tensile stress and can be arrested by removing these stresses. Further the cracks can be closed by including a compressive force sufficient to overcome the tension a residual compression.

**7. Write short notes on Autogenous healing.**

The inherent ability of concrete to heal cracks within “autogenous healing”. This is used for sealing dormant cracks such as precast units cracked in handling of cracks developed during the precast piling sealing of cracks in water tanks and sealing of cracks results of temporary conditions.

**8. Give a brief account on routing and sealing.**

This method involves enlarging the cracks along its exposed surface, filling and finally sealing it with a suitable material. This is the simplest and most common technique for sealing cracks and is applicable for sealing both fine pattern cracks and larger isolated.

**9. List any four causes of cracks?**

- Use of unsound material
- Poor & bad workmanship
- Use of high water-cement ratio
- Freezing & thawing
- Thermal effects
- Shrinkage stresses

**10. What are the types of cracks?**

- a) Class-1: Cracks leading to structural failure
- b) Class-2: Cracks causing corrosion
- c) Class-3: Cracks affecting function

**11. What is pneumatically applied mortar?**

Pneumatically applied mortar is used for the restoration of when the location of deterioration is relatively at shallow depth. It can be used on vertical as well as on horizontal surfaces and is particularly restoring surfaces spalled to

corrosion of the reinforcement. Damaged concrete elements also retrofitted using this method. This also has known as gunning or shotcreting techniques.

**12. What is caging with steel?**

A steel caging is prepared and made to surround the existing masonry so that lateral expansion when it is loaded in compression. The confinement of masonry will steel cage increases its capacity and ductility.

**13. Give a brief note on dogs in stitching.**

The dogs are thin and long and to cannot take much of compressive force. The dogs must be stiffened and strengthened by encasement in an overlay or some similar means.

**14. Give some concrete materials used to overcome weathering action on concrete.**

The two concrete repair materials used were

- (i) a flow able concrete with 16 mm aggregate and containing a plasticizer and a shrinkage-compensating additive, to be cast against forms in heights up to 1.5m, and
- (ii) a patching mortar to be applied brendering, for areas less than .01 m<sup>2</sup>

**15. Give a brief note on shoring and underpinning in demolition.**

The demolition contractor has a legal obligation to show technical competence when carrying out the work. When removing sections of the building which could have leave other parts unsafe, adequate temporary supports and shoring etc. must be provided.

**UNIT V**

**REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES**

**1.What are the preliminary investigations before demolition of a structure?**

- The demolition contractor should have ample experience of the type of work to be offered;
- Fully comprehensive insurance against all risks must be maintained at all times;
- An experienced supervisor should be continuously in charge of the work;
- The contract price should include all safety precautions included in the relevant building regulations;
- The completion date should be realistic, avoiding and need to take risks to achieve the date

**2. Write about protective clothing given before demolition.**

Buildings where chemicals have been stored or where asbestos, lead paint, dust or fumes may be present will require specialized protective clothing

### **3. Give a brief note on shoring and underpinning in demolition.**

The demolition contractor has a legal obligation to show technical competence when carrying out the work. When removing sections of the building which could have leave other parts unsafe, adequate temporary supports and shoring etc. must be provided.

### **4. What are the major factors in selecting a demolition procedure?**

- Major factors to be considered in selecting an appropriate technique include:-
- Safety of personnel and public
- Working methods
- Legislation applicable
- Insurance cover

### **5. Give the categories of demolition techniques.**

- Demolition techniques may be categorized as:-
- Piecemeal demolition, using hand-held tools or machines, to reduce the height of the building or structure gradually;
- Deliberate controlled collapse, demolition to be completed at ground level.

### **6. Write short notes on demolition by hand.**

Demolition of buildings or structure by hand-held tools such as electric or pneumatic breakers, sometimes as a preliminary to using other methods, should be carried out, where practicable, in the reverse order to the original construction sequence. Lifting appliances may be necessary to hold larger structural members during cutting and for lowering severed structural members and other debris.

### **7. In what cases demolition by machine can be done?**

Simple roof structures supported on wall plates should normally be demolished to the level of wall plates by hand, but if this may involve unsafe working, then demolition totally by machine may be appropriate.

### **8. Write short notes on balling machine.**

Balling machines generally comprise a drag-line type crawler chassis fitted with a lattice crane jib. The demolition ball, with a steel anti-spin device, is suspended from the lifting rope and swung by the drag rope.

### **9. What is a hydraulic pusher arm?**

Articulated, hydraulically-powered pusher-arm machines are normally mounted on a tracked or wheeled chassis, and have a toothed plate or hook for applying a horizontal force to a wall. The machine should stand on a firm level base and apply force by a controlled movement of the pusher arm.

#### **10. What is pre-weakening?**

Buildings and structures normally have structural elements designed to carry safely the loading likely to be imposed during their life. As a preliminary to a deliberate controlled collapse, after loads such as furnishings, plant and machinery have been removed, the demolition contractor may be able to weaken some structural elements and remove those now redundant. This pre weakening is essentially a planned exercise and must be preceded by an analysis of its possible effects on the structure until it collapses, to ensure that the structural integrity of the building is not jeopardized accidentally. Insufficient information and planning relating to the structure may result in dangerous and unsafe work.

#### **11. What is deliberate collapse?**

The deliberate collapse of the whole or part of a building or structure requires particularly high standards of planning, supervisions and execution, and careful consideration of its effect on other parts of the structure or on adjacent buildings or structures. A surrounding clear area and exclusion zone are required to protect both personnel and property from the fall of the structure itself and debris which may be thrown up by the impact.

#### **12. What are the considerations before demolition?**

- Considerations should be given to:-
- Conducting a site and building survey, with a structural bias;
- The examination of drawings and details of existing construction where available;
- The preparation of details and drawings from site survey activities where no such information is available;
- Establishing previous use of premises, especially with regard to flammable substances or substances hazardous to health or safety;
- Programming the sequence of demolition work;
- The preparation of a Method Statement.
-

**13. What is overlay?**

Overlays may be used to restore a spalling or disintegrated surface or to protect the existing concrete from the attack of aggressive agents. Overlays used for this purpose include concrete or mortar, bituminous compounds etc. Epoxies should be used to bond the overlays to the existing concrete surface.

**14. Give short note on Jacketing.**

Jacketing consists of restoring or increasing the section of an existing member by encasing it in a new concrete. This method is useful for protection of section against further deterioration by providing additional to in member.

**15. Give an account on how metal bonding is done on concrete member.**

On the tension side of the beam 2 to 3mm steel plates are to the existing beam to increase its capacity. The glue or adhesive should compatible with the existing concrete with behavioral characteristics under load addition to providing integrity with parent member.

**16. How clamps are used to overcome low member strength?**

The distress is due to inadequate stirrups either due to deficiency in the of provision of C- stamps, U-clamp fixed externally along the length of beam to provide adequate these will be protected by covering with rich mortar or concreting as the a later stage.

**17. Define grouting.**

Grouting can be performed in a similar manner as the injection of an epoxy. However the use of an epoxy is the better solution except where considerations for the resistance of cold weather prevent such use in which case grouting is the comparable alternative.

**CE 6021 – REPAIR AND REHABILITATION OF STRUCTURES**

**SIXTEEN MARK QUESTIONS**

**UNIT I**

**MAINTENANCE AND REPAIR STRATEGIES**

1. Describe the steps in the assessment procedure for evaluate damages in a structure and to carry out rehabilitation work.
2. Explain the various causes for deterioration of concrete structures.

3. Describe in detail about the prevention aspect of maintenance.
4. Describe in detail about the repair aspect of maintenance.
5. Describe about the inspection to be carried out during and after the construction of structure
6. Discuss the importance of maintenance.
7. With graph explain the service life behavior of a concrete structure with respect to maintenance
8. Explain the different types of maintenance to the structural elements.
9. As a site engineer what are the factors you would check during the day of concreting to assure quality in construction? Explain in detail.
10. Explain the causes, solution and preventive measures for (i) Bug Holes (ii) Honeycombing.

## **UNIT II**

### **STRENGTH AND DURABILITY OF CONCRETE**

1. Why quality assurance for structure is needed? Explain the components of quality assurance for building.
2. List the various parameters affecting the quality of concrete construction. Explain any three in detail.
3. Discuss in detail about the thermal properties of concrete. Explain how concrete structure is affected by thermal condition.
4. Elaborately explain about the effect of temperature on concrete.
5. Explain the various corrosion protection methods.
6. Explain in detail about the permeability of concrete.
7. With chemical equation explain in detail about the mechanism of corrosion. Also discuss the factors influencing the corrosion.
8. Explain about the design error for concrete building Explain the behavior of RC elements due to faulty design and construction errors-draw neat sketches
9. Explain in detail about quality assurance.

## **UNIT III**

### **SPECIAL CONCRETES**

1. Explain the manufacturing process and application of expansive cement.

2. Explain the special materials, manufacturing process, properties and uses of polymer concrete and its types.
3. Explain the manufacturing process, properties and uses of sulphur infiltrated concrete.
4. Explain the following (i) Bacterial Concrete (ii) Ferro Cement
5. Explain in detail fiber reinforced polymeric meshes
6. Explain the following (i) High performance concrete (ii) Fibre reinforced concrete
7. Briefly discuss special methods adopted for accelerated strength gaining of concrete? Explain.
8. With respect to aspect ratio and volume fraction. Also explain their effects on fresh and hardened concrete properties. Explain with its stress-strain curve.
9. Tabulate the different types of fibers used in concrete. What are its advantages?
10. Explain the mechanism of the following corrosion protection methods. (i) Corrosion Inhibitors (ii) Cathodic Protection.

#### **UNIT IV**

##### **TECHNIQUES FOR REPAIR AND PROTECTION METHODS**

1. Explain the process of epoxy injection. Also explain routing and scaling with sketches.
2. Explain the methods of with types and applications. (i) Shotcreting (ii) Guniting
3. Describe the preliminary procedures in demolition of a structure.
4. Explain the demolition process of a damaged structure.
5. Describe in detail about the impulsion method of demolition of structures.
6. Discuss in detail about any case study on demolition of structures.
7. Explain the following (i) Vacuum Concrete (ii) Foamed concrete
8. Discuss the following methods of demolition (i) Non explosive demolition agents. (ii) Saw cutting (iii) Water Jet (iv) Explosive
9. Explain in detail any two corrosion protection methods.
10. Explain the procedure of fusion bonded epoxy coating of rebars with a simple sketch. Also give the advantages and disadvantages.

#### **UNIT V**

##### **REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES**

1. Explain the various techniques available for repair of cracks.
2. Explain the various techniques to repair spalling and disintegration of concrete.



3. Describe the various strengthening techniques to overcome low member strength.
4. Explain in detail about Chemical disruption on concrete.
5. Describe in detail about the weathering action on concrete.
6. Explain the different methods of flexural strengthening techniques for reinforced concrete members-draw neat sketches.
7. How do you evaluate repair, and rehabilitate a structure distressed due to fire and marine exposure?
8. How do you repair a structure distressed due to corrosion? Describe in detail.
9. Explain how cracks may be sealed by using epoxy injection resin.
10. Explain the repair methodology (i) Epoxy injection (ii) Corrosion protection methods