



WINTER- 16 EXAMINATION

Model Answer

Subject Code:

17531

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q. N.	Answer	Marking Scheme
1	a) (i)	<p>Attempt any THREE of the following: Enlist various methods of purification of water.</p> <ol style="list-style-type: none"> 1) Physical methods 2) Chemical methods 3) Biological methods <ul style="list-style-type: none"> • Physical methods are 1) screening 2) Grit Chambers 3) Absorption 4) Sedimentation 5) Flotation 6) Filtration 7) Heat transfer operation • Chemical methods are 1) Neutralization 2) Oxidation 3) Chlorination 4) Reduction 4) Ion exchange. • Biological methods are 1) Aerobic biological treatment 2) Anaerobic biological treatment 	4 Marks
	(ii)	<p>Draw a format of machine history chart.</p> <p>Figure shows a typical machine history chart Any similar chart can be accepted from students</p>	4 Marks

(iii)	<p>Enlist benefits of TPM.</p> <ol style="list-style-type: none"> 1) Improvements in operational efficiency 2) Improvements in reliability 3) Improvements in quality 4) Lower operating cost 5) More emphasis on planning and preventative maintenance 6) Increased equipment life span 7) Higher morale from improved job satisfaction and job security 8) Improvements in inventory -cost reduction 	4 Marks
(iv)	<p>Enlist various systems of lubrication. Following are the various systems of lubrication.</p> <p>i) Wick ii) Pad iii) Sump iv) Splash v) Centralized.</p>	4 Marks
b)	<p>Attempt any ONE of the following:</p> <p>(i) Describe electric power distribution system with help of neat sketch.</p> <p>An electric power system is a network of electrical components used to supply, transmit and use electric power. An example of an electric power system is the network that supplies a region's homes and industry with power - for sizable regions, this power system is known as the grid and can be broadly divided into the generators that supply the power, the transmission system that carries the power from the generating centres to the load centers and the distribution system that feeds the power to nearby homes and industries. Smaller power systems are also found in industry, hospitals, commercial buildings and homes. The majority of these systems rely upon three-phase AC power - the standard for large-scale power transmission and distribution across the modern world.</p>	Diagram 3 Marks
		Explanat ion 3 Marks
	<p>A schematic of a simple transmission/distribution system is shown in the adjoining figure which clearly shows the various steps involved transferring power from generation point to the point where it finally gets consumed. The main components such as generators, transformers and grounding are shown which will be discussed at later stages.</p>	

(ii) Describe industrial lighting system with the help of neat sketch.

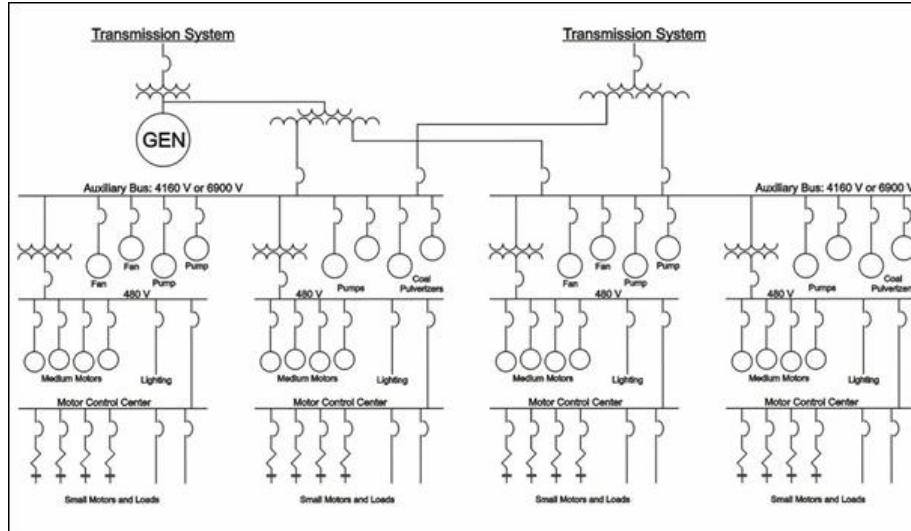


Figure
3 Marks

Explanat
ion 3
Marks

Figure 1 shows a typical one-line diagram for an electric power generation plant. Some of the circuits supply only utilization equipment. For example, each lighting circuit has its own circuit breaker that is independent of (does not control) other loads in the generating station. If any of the other loads supplied by the panel board or switchboard containing such a circuit breaker is used in the generation of power, the panel board or switchboard and its supply wiring are not covered by Subpart S. Branch circuits that supply utilization loads are covered under the Subpart S installation requirements. Branch circuits that supply generation loads are not covered under Subpart S and are covered by 1910.269.

Frequently, installations in electrical generating plants contain utilization circuits as well as circuits and equipment used solely for the power generation process. To determine whether a circuit or equipment is commingled, one can generally examine the circuit or equipment to be serviced to determine if an outage or interruption of the circuit or equipment results in a target indication or event recording in the control center. If this is the case, then it's 269 related. Absent this it's probably Subpart S related and all of subpart S requirements need to be applied.

2. Attempt any FOUR of the following:

a) Describe procedure of preventing maintenance.

Every preventive maintenance work should be pre-planned in detail on the basis of analysis done on the passed records. A scheduled programme thus prepared should be followed strictly. Thus programme should be in detail specifying the point requiring daily, weekly, monthly, half yearly or yearly attention.

In Planning of maintenance work involves the following steps

1. Anticipation of maintenance work
2. Visualization of the nature and details of that work
3. Determination of the best method to perform the work
4. Arranging for the required material
5. Securing alternations in production programme or scheduling of maintenance work to
6. confirm to production plans
7. Allocation of work to individuals
8. Instructing the individuals about the schedules and methods
9. Following up and checking of work
10. Evaluation of the work and performance.

4 Marks



	<p>When servicing equipment, hazards not related to your process operation are likely to be introduced. For this reason, it is important to prepare written servicing procedures that include the following: A clear, step-by-step procedure, in checklist form, for controlling hazardous energy</p> <p>In Scheduling of maintenance work involves the following steps</p> <ol style="list-style-type: none">1. System should be clear, precise and easy to operate2. Should be based upon accurately determined time standards3. Should be finalized in consultation with production department so that the equipments for maintenance purposes can be spared4. Should aim at creating a balanced work load on each trade section in the department, that is, each section should be evenly loaded.	
b)	<p>Describe activities performed in final stage (i.e. Complete overhaul) of repair cycle.</p> <ol style="list-style-type: none">1) To check for accuracy before dis-assembly.2) To measure the wear on friction surfaces before repairing base parts (like beds).3) To completely dis-assemble the machine and all its units4) To wash and wipe out all the parts5) To inspect all the parts.6) To make out defect list and the repair estimate.7) To replace/restore worn-out parts.8) To repair coolant system and its pipe fittings.9) To change oil pumps and repair lubricating/hydraulic system. To replace oil.10) To grind/ scrap all guide surfaces of beds, tables, carriage, slides, columns, traverse, supports etc.11) To replace/ restore tables with torn-out T-slots12) To repair/replace guards & fencings and also arrangements for protecting the machine parts from metal chips and abrasive dust13) To assemble all the units of the machine. To check for proper inter-operation of all the units and all mechanism of the machine.14) To paint all the internal and external un-machined surfaces of the machine after filling putty.15) To run the machine on no load at all speeds and feeds. To check for noise and heating.16) To check for accuracy as per accuracy test charts. To check accuracy of machined parts for the machines in which jigs and fixtures are constantly employed.17) For machine installed on deep foundation, to check the condition of the foundation and rectify it. To check installation of the machine and the cement bearing.18) If medium repair and complete overhaul are organized centrally in the central maintenance workshop, small machines weighing up to 2.5 tons are removed from the foundation & shifted to the central maintenance shop for these repairs. Large heavy, extra heavy and unique machines are not recommended to be removed from the foundation, and the medium repair and complete overhaul should be done in place.	4 Marks
c)	<p>State the importance of maintenance manuals and reports.</p> <p>Maintenance Manuals:- When customer purchases new product manufacturer provides service or maintenance booklet which is called as maintenance manuals. It provides information about assembly and part drawing of product, technical information about assembly and product, maintenance schedule with respect to time scale for product. Standardize maintenance procedure is provided by manufacturer. Maintenance check and care points are noted in the manual.</p> <p>Maintenance reports:- The maintenance data is recorded in the tabular formats which are called as maintenance reports. The maintenance engineering departments are responsible for all the data and activities mentioned in the reports.</p>	2 Marks



	<p>It is necessary to maintain the reports for the following reasons,</p> <ol style="list-style-type: none">1) For preparing maintenance schedule2) Equipment replacements analysis3) Use of these documents for improvement as well as to get history of maintenance4) To determine frequency of inspection and maintenance5) Budgeting for major overhauls.	2 Marks
d)	<p>Give a list of tools which will be necessary for performing breakdown maintenance activity for a lathe machine.</p> <p>Following are some of the tools necessary for performing breakdown maintenance activity for a lathe machine.</p> <ol style="list-style-type: none">1. Hammer2. Spanner set3. Adjustable Wrench4. Bend5. Pipe Cutter6. Allen key set7. Aluminum block for hammer	4 Marks
e)	<p>What are basic systems of TPM?</p> <p>TPM is a system of maintaining and improving the integrity of production and quality systems through the machines, equipment, processes, and employees that add business value to an organization. TPM was first applied by the Japanese company Nippondenso, a supplier to the automotive industry. One of the main objectives of TPM is to increase the productivity of plant and equipment with a modest investment in maintenance. Total quality management (TQM) and total productive maintenance (TPM) are considered as the key operational activities of the quality managementsystem.TPM employs Breakdown maintenance, Preventive maintenance, Predictive maintenance and Corrective maintenance as its tools.TPM results in Improved operational efficiency and reliability. Thus the important features of TPM in brief are as below:</p> <ol style="list-style-type: none">1) Adoption of life cycle approach for improving the overall performance of production equipment.2) Improving productivity by highly motivated workers which is achieved by job enlargement.3) The use of voluntary small group activities for identifying the cause of failure, possible plant and equipment modifications.	4 Marks
3.	<p>a) Attempt any FOUR of the following: “The concept of TPM can be applied in administrative and support departments also” – Justify the statement.</p> <p>Administrative TPM applies TPM activities to continuously improve the efficiency and effectiveness of logistic and administrative functions. These logistic and support functions may have a significant impact on the performance of manufacturing production operations. Consistent with the view of a ‘production system’ that includes not only manufacturing, but also manufacturing support functions, TPM must embrace the entire company, including administrative and support departments.</p> <p>Manufacturing is not a stand-alone activity, but is now fully integrated with, and dependent on, its support activities. These departments increase their productivity by documenting administrative systems and reducing waste and loss. They can help raise production-system effectiveness by improving every type of organized activity that supports production.</p> <p>Like equipment effectiveness improvement. Administrative TPM focuses on identifying and eliminating effectiveness losses in administrative activities. Figure 01 illustrates the type of effectiveness losses that are addressed in Administrative TPM. Implementing Administrative</p>	4 Marks

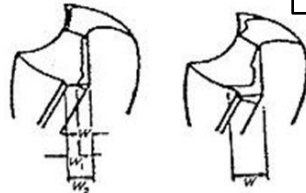
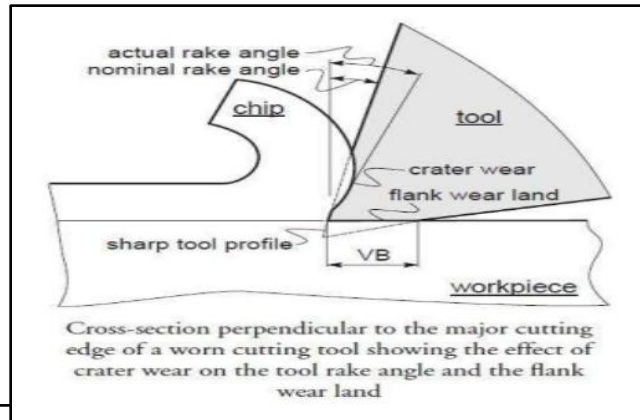
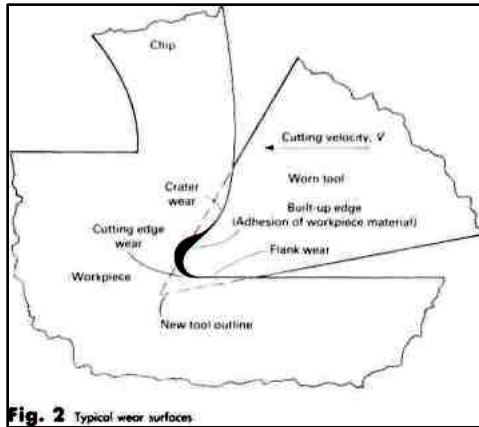
TPM is similar to equipment/process related TPM continuous improvement. The methodologies used in Focused Improvement, Autonomous Maintenance, Planned Maintenance, Maintenance Prevention, and Quality Maintenance are applied to administrative and support tasks and activity.

Training and Education, of course, supports Administrative TPM also. TPM is a proactive approach to avoiding all kinds of voids. The principle is "zero error, zero work accident and zero loss".

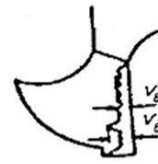
b) Draw diagrams showing wear behavior due to primary wear process.

“Wear is the progressive loss of substance from the surface of a solid body caused by mechanical action, i.e , contact and relative motion with a solid, liquid or gaseous counter-body”.

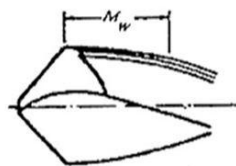
4 Marks



a) Outer corner wear



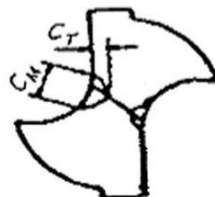
b) Flank Wear



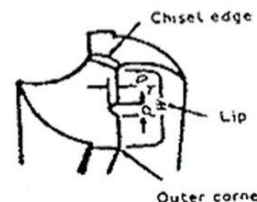
c) Margin Wear



d) Crater Wear



e) Chisel Edge Wear



f) Chipping

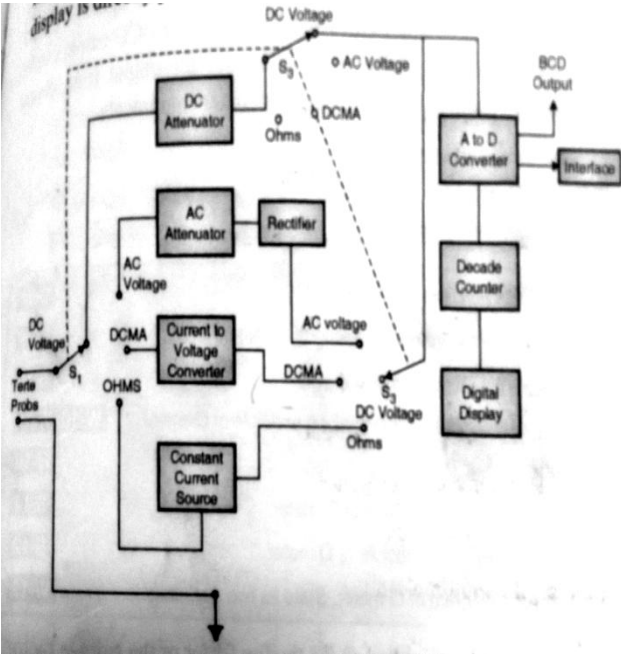
c) State conditions in which following systems of lubrication are suitable

- i) Wick-** Oil lamp
- ii) Pad-** Suitable for Ideal small to medium size blanks, rectangular or shaped
- iii) Sump**—In oil reservoir tanks of oil hydraulic system.
- iv) Splash** - It is widely used in small four-cycle engines for lawn mowers, outboard marine operation

4 Marks



<p>d)</p>	<p>Describe allocation of maintenance job responsibility in TPM.</p> <ol style="list-style-type: none">1) To begin applying TPM concepts to plant maintenance activities, the entire work force must first be convinced that upper level management is committed to the program.2) The first step in this effort is to either hire or appoint a TPM coordinator. It is the responsibility of the coordinator to sell the TPM concepts to the work force through an educational program. To do a thorough job of educating and convincing the work force that TPM is just not another "program of the month," will take time, perhaps a year or more.3) Once the coordinator is convinced that the work force is sold on the TPM program and that they understand it and its implications, the first study and action teams are formed.4) These teams are usually made up of people who directly have an impact on the problem being addressed. Operators, maintenance personnel, shift supervisors, schedulers, and upper management might all be included on a team.5) Each person becomes a "stakeholder" in the process and is encouraged to do his or her best to contribute to the success of the team effort.6) Usually, the TPM coordinator heads the teams until others become familiar with the process and natural team leaders emerge.7) A long-range outlook must be accepted as TPM may take a year or more to implement and is an on-going process. Changes in employee mind-set toward their job responsibilities must take place as well.	<p>4 Marks</p>
<p>e)</p>	<p>Describe following wear processes :</p> <p>i) Adhesive Wear</p> <p>Surface roughness also contributes to adhesion. For this type of wear a material's compatibility will be important. Compatibility does not mean materials that work well together; rather, that the materials "like" each other, causing them to stick together. This compatibility forms a bond causing parts to seize and even become cold-welded together. There are a few general rules to follow for material selection to make sure unwanted adhesive wear doesn't occur. Materials that make contact with one another, in general, should:</p> <ul style="list-style-type: none">• Not dissolve in the other• Not, in given environment and other conditions, form into an alloy• Not be identical (e.g., an aluminum shaft with an aluminum bearing)• Have at least one metal from the B-subgroup (e.g., elements to the right of Nickel, Palladium, and Platinum on the periodic table). <p>Adhesion is possible to calculate. The adhesion and abrasive wear calculations share the same formula; however, it can vary by as much as +/-20%. This inaccuracy is due to constant changing surface conditions and lubrication during operation. It may be better than no data, but designers need to be aware of the limitations and accuracy of the formula. Trying to calculate or predict wear is made more difficult if components have non-conforming geometries, such as when gear teeth and cams are involved. These components can have difficulty staying properly lubricated. To reduce adhesive wear, sometimes corrosive wear is purposely induced.</p> <p>ii) Corrosive Reaction</p> <p>Corrosive action is the gradual destruction of materials (usually metals) by chemical reaction with their environment. Corrosion is a natural process, which converts a refined metal to a more stable form, such as its oxide, hydroxide, or sulfide.</p> <p>Corrosion Prevention:-</p> <ol style="list-style-type: none">1) Proper selection of materials with known resistance to the service environment2) Control pH, chloride concentration and temperature3) Cathodic protection and/or Anodic Protection4) Use higher alloys (ASTM G48) for increased resistance to pitting corrosion	<p>2 Marks</p> <p>2 Marks</p>

4a)	<p>Attempt any THREE</p> <p>i)</p> <p>Ans</p> <p>ii)</p> <p>Ans</p>	<p>Compare between preventive maintenance and breakdown maintenance</p> <ol style="list-style-type: none"> 1. A relationship exists between the amount of preventive maintenance which has to be performed and the amount of breakdown maintenance which is required. Increase in preventive maintenance can be accepted to reduce the frequency for breakdown maintenance. 2. The component which is not replaced or repaired for preventive maintenance reasons then it eventually malfunctions and damages other component of the machine. This increases frequency and the cost of breakdown maintenance. 3. Breakdown maintenance cannot be planned and scheduled as systematically and efficiently as preventive maintenance. 4. Preventive maintenance is planned activity analysis knows when it will take place and how much time is required and what resources are required for its implementation. 5. When the cost of preventive maintenance increases the cost of breakdown decreases but after certain limit increases in expenditure on preventive maintenance becomes uneconomical. For which an optimum point can be determined <p>Describe working of multimeter with the help of neat diagram</p> <p>The multimeter is an instrument capable of measuring dc voltage, ac voltage, dc current, resistance, conductance and describes. All digital multimeters make use of some type of analog to digital converter. An unknown current to be measured is applied to one of the input terminals of op-amp. Since an input impedance of op-amp is very high, very small current can pass through it. This feedback current is allowed to pass through one of the known resistances. This voltage is applied to analog to digital converter and finally digital display is obtained. Thus output displayed on the digital display is directly proportional to unknown current.</p>  <p style="text-align: center;">Figure:- Digital Multimeter</p>	<p>1 Mark each for any 4 Points</p> <p>2 Marks for working and 2 Marks for Diagram</p>



	iii)	Explain necessity of circuit breakers in electrical maintenance	
	Ans	<ol style="list-style-type: none">1) Interruption of small inductive currents2) Switching of unloaded transmission lines and unloaded cables3) Switching of power banks4) Interruptions of terminal faults5) Interruptions of short line faults6) Asynchronous switching	1 Mark each for any 4 Points
	iv)	How Industrial accidents can be avoided?	
	Ans	<ol style="list-style-type: none">1) Keep Workspaces Clean2) Employers should post signs reminding employees of proper safety procedures in noticeable places and in spaces where those specific procedures should be practiced.3) Keep up to date maintenance of machines and instruments4) Report Dangers and Accidents5) Provide Proper Training6) Provide Proper Equipment	1 Mark each for any 4 Points
	v)	Enlist different sources of losses, that are identified and eliminated by TPM	
	Ans	<ol style="list-style-type: none">[1] Failure losses - Breakdown loss[2] Setup / adjustment losses[3] Defect / rework los[4] Scheduled downtime loss[5] Reduced Speed[6] Process Defects[7] Reduced Yield	1 Mark each for any 4 Points
b)	i)	How lubricants are selected?	
	Ans	<p>Lubricants are selected according to the following criteria's</p> <ol style="list-style-type: none">[1] Depending upon types of guides:-<ol style="list-style-type: none">a) Circular guides b) Flat guides c) Cylindrical guides[2] Types of Work:-<ol style="list-style-type: none">a) Constant working b) Periodic working c) Intermittent working[3] Accuracy of the units required[4] Possibility of assembly and installation[5] Viscosity required for the application[6] Depending upon the frictional heat generation[7] According to their boiling point and freezing point	1 Mark each for any 6 Points

- [8] According to their thermal stability
- [9] According to their hydraulic stability
- [10] Capacity of corrosion prevention
- [11] Ability to prevent oxidation

ii) How earthing is provided for electrical installation?

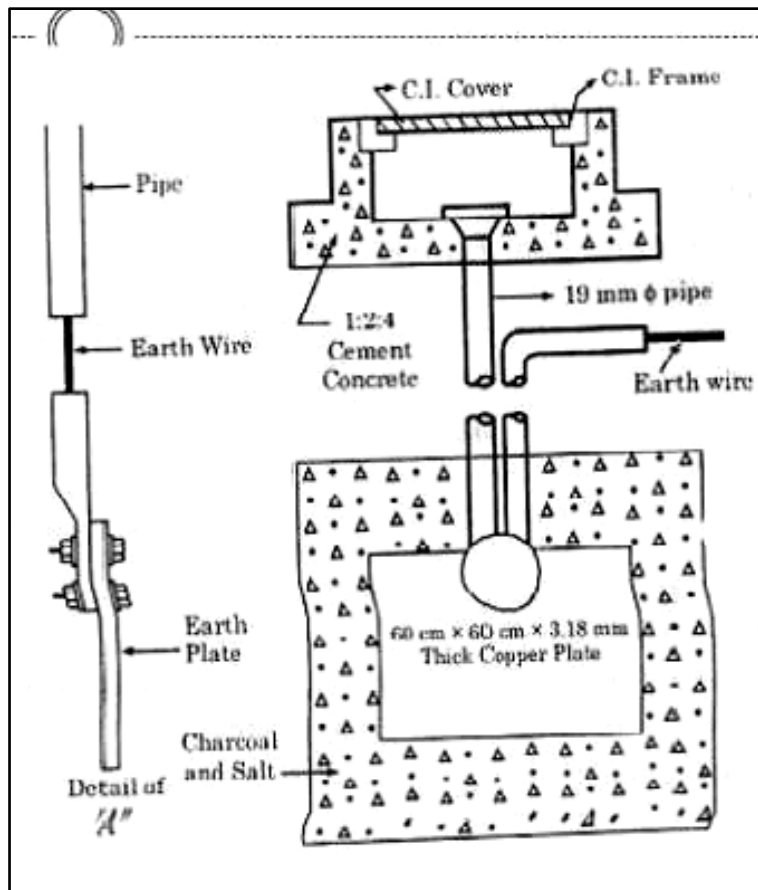
Ans The important methods of earthing are the plate earthing and the pipe earthing. The earth resistance for copper wire is 1 ohm and that of G I wire less than 3 ohms. The earth resistance should be kept as low as possible so that the neutral of any electrical system, which is earthed, is maintained almost at the earth potential. The typical value of the earth resistance at powerhouse is 0.5 ohm and that at substation is 1 ohm.

1. Plate earthing

2. Pipe earthing

Plate Earthing

In this method a copper plate of 60cm x 60cm x 3.18cm or a GI plate of the size 60cm x 60cm x 6.35cm is used for earthing. The plate is placed vertically down inside the ground at a depth of 3m and is embedded in alternate layers of coal and salt for a thickness of 15 cm. In addition, water is poured for keeping the earth electrode resistance value well below a maximum of 5 ohms. The earth wire is securely bolted to the earth plate. A cement masonry chamber is built with a cast iron cover for easy regular maintenance.



4 Marks for explanation

And

2 Marks for diagram

5

a)

Attempt anyFour

Ans

State importance of safety policies in improving safety of plant

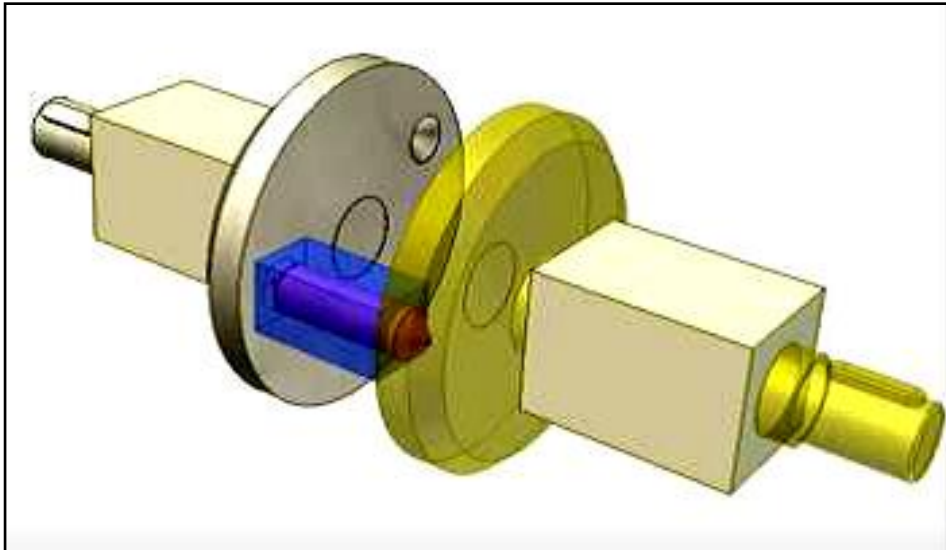
- (1) It provides workers with a safe work environment.
- (2) Conduct routine/regular workplace inspections.
- (3) It provides Personal Protective Equipment.
- (4) It can develop and implement safe work procedures and rules.
- (5) Provide on-going safety training
- (6) Enforce safety rules and appropriate discipline.
- (7) Provide on-going property conservation practices

b)

Ans

Describe the working of fool proofing device for interlocking parallel shafts, with the help of a neat sketch

An interlock is a device used to prevent undesired states in a state machine, which in a general sense can include any electrical, electronic, or mechanical device or system. In most applications an interlock is used to help prevent a machine from harming its operator or damaging itself by stopping the machine when tripped. Household microwave ovens are equipped with interlock switches which disable the magnetron if the door is opened. Similarly household washing machines will interrupt the spin cycle when the lid is open. Interlocks also serve as important safety devices in industrial settings, where they protect employees from devices such as robots, presses, and hammers. Trapped key interlocking is a method of ensuring safety in industrial environments by forcing the operator through a predetermined sequence using a defined selection of keys, locks, switches and gears.

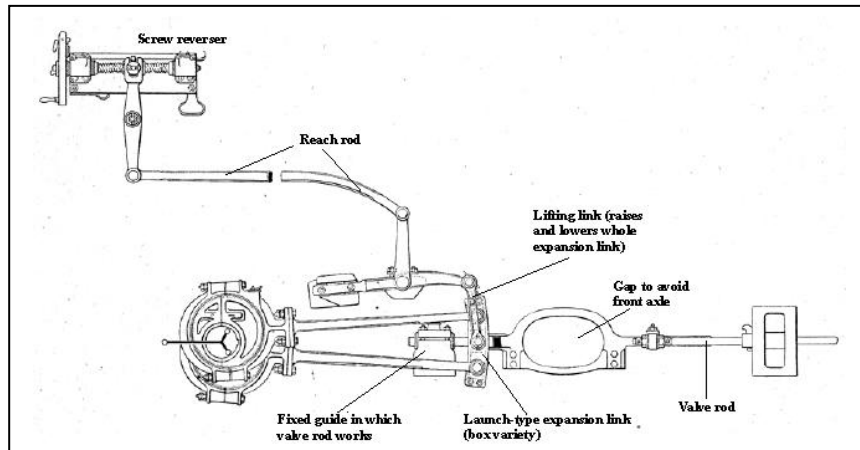


**1 Mark
each for
any
4 Points**

**2 Marks for
explanation
and
2 Marks for
sketch**

c) **Describe working of lever controlled reversal mechanism with the help of neat sketch.**

It consists of a long lever mounted, parallel to the direction of travel, on the driver's side of the cab. It has a handle and sprung trigger at the top and is pivoted at the bottom so as to pass between two notched sector plates. The reversing rod, which connects to the valve gear, is attached to this lever, either above or below the pivot, in such a position as to give good leverage. A square pin is arranged so as to engage with the notches in the plates and hold the lever in the desired position when the trigger is released.



2 Marks for Explanation

and

2 Marks for Sketch

d) **Describe important properties of lubricants**

- Ans
- [1] It should have high boiling point and low freezing point
 - [2] It should have high viscosity index
 - [3] It must possess thermal stability
 - [4] It should have good hydraulic stability
 - [5] It should have demulsibility
 - [6] It must provide good corrosion prevention
 - [7] High resistance to oxidation.

1 Mark each for any 4 Points

e) **In a small workshop, having 10 general purpose machine tools, what safety measures can you suggest you to prevent sudden fire due to electricity**

- Ans
- [1] Keep all electrical devices in good working condition
 - [2] If a cord is frayed, have an electrician replace it or buy a new device
 - [3] Don't linked more than two appliances or devices (machines) in one outlet
 - [4] Have a working smoke detector on each floor of the house
 - [5] Make sure all machines have ground fault circuit interrupter outlets
 - [6] Have an electrician inspect of all machines and make a recommendation about installing arc fault circuit interrupters

1 Mark each for any 4 Points



6	a) Ans	<p>Attempt any Two</p> <p>Describe stand by and emergency power facilities in plant</p> <p>Emergency Power System: “an independent reserve source of electric energy that, upon failure or outage of the normal source, automatically provides reliable electric power within a specified time to critical devices and equipment whose failure to operate satisfactorily would jeopardize the health and safety of personnel or result in damage to property.</p> <p>These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life.</p> <p>Standby Power System: “an independent reserve source of electric energy that, upon failure or outage of the normal source, provides electric power of acceptable quality so that the user’s facilities may continue in satisfactory operation”.</p> <p>These systems are intended to automatically supply power to selected load in the event of failure of the normal source. standby systems are typically installed to serve loads, such as heating and refrigeration systems, communications systems, ventilation and smoke removal systems, sewage disposal, lighting systems, and industrial processes that, when stopped during any interruption of the normal electrical supply, could create hazards or hamper rescue and fire-fighting operations</p> <p>Emergency and standby power systems are generally designed into the over-all electrical system for one of the following two reasons:</p> <p>[1] Legal Requirements – As required by local, state government requirements. These are concerned with the safety of human life, protection of the environment, etc.</p> <p>[2] Economic Considerations – Continuous process applications often require a continuous source of electrical power to avoid significant economic loss. In some cases even a momentary loss of power can be disastrous</p>	4 Marks
	b) Ans	<p>i) Predictive Maintenance</p> <p>ii) Corrective Maintenance</p> <p>Predictive Maintenance :- Predictive maintenance means predicting the failure before it occurs. It includes identifying root causes for failure and eliminating it before failure occurs. It helps to prevent extensive damage to machine tool. Predictive maintenance involves:-</p> <p>1) Detection of faults:- From noise in systems, vibration, poor performance etc. faults are predicted</p> <p>2) Analysis:- finding the root causes for problems</p>	4 Marks
		<p>1) Detection of faults:- From noise in systems, vibration, poor performance etc. faults are predicted</p> <p>2) Analysis:- finding the root causes for problems</p>	4 Marks



3) **Correction:-** Repairing works carried out

Corrective Maintenance:-

Corrective maintenance work is maintenance work that involves repair or replacement of components that are about to fail.

With prior information about life of component those can be replaced at that time period.

Different sensors are used to detect any change in various process parameters.

The main objective of this maintenance work is to take action before failure occurs.

The aim of corrective maintenance is to help those responsible for conducting the maintenance and monitoring the machines to do it easily and safely and efficiently

c)

Describe the role of personal protective equipment's in improving safety of a plant along with examples of such equipment

Ans

	Role	Example
1	Respiratory protection	Disposable, cartridge, air line, half or full face
2	Eye protection	Spectacles/goggles, shields, visors
3	Hearing protection	Ear muffs and plugs.
4	Hand protection	Gloves and barrier creams.
5	Foot protection	Shoes/boots
6	Head protection	Helmets, caps, hoods, and hats
7	Working from heights	Harness and fall arrest devices
8	Skin protection	Hats, sunburn cream, long sleeved clothes

Ex:-Foot Protection:Safety boots and shoes with protective toecaps and penetration-resistant, mid-sole wellington boots and specific footwear, e.g. foundry boots and chainsaw boots.

Footwear can have a variety of sole patterns and materials to help prevent slips in different conditions, including oil- or chemical-resistant soles. It can also be anti-static, electrically conductive or thermally insulating

Appropriate footwear should be selected for the risks identified.

Replace head protection if it is damaged

1 Mark each for any 4 correct Points for role

And

1 Mark each for any 4 correct Points for examples