



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code

17558

Page 1 of 26

**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 judgement 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.



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558



Q No.	Answer	marks
1-A	Any 3	12
1A-a	<b>Hazardous properties of chemicals</b> (any 4)  1. Irritation of eyes, conjunctivitis, irritation of nose and throat. eg. Ammonia. 2. Blood cancer, eg. Irritation, burning, anaesthetic effects eg. Benzene. 3. Irritation of eyes , mucous membrane , depression , mental deterioration. eg. Bromine. 4. Fire hazard, explosion hazard eg.CO, CS <sub>2</sub> 5. Corrosion hazard eg. Bromine. 6. Highly reactive hazard eg. Phosgene. 7. Disaster potential hazard eg.SO <sub>2</sub> , naphtha H <sub>2</sub> S.	1 mark each
1A-b	<b>Factors to be considered for safe handling of chemicals:</b>  1. Ignition temperature of the chemical 2. Radiation property of the chemical 3. Explosive nature of the chemical 4. Corrosive nature of the chemical 5. Flammable nature of the chemical 6. Toxic nature of the chemical 7. Size of the chemical 8. Quantity of chemicals	1 mark each for any 4



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code


17558

9. Physical properties of the chemical		
1A-c	<b>Diagram of non respiratory protective device(any 2)</b>  Helmet                      hand gloves  Ear plug                      Apron(suit)	2 mark each



WINTER-16 EXAMINATION  
Model Answer

Subject code 17558

	 <p>The diagram shows safety goggles on the left and a pair of yellow safety shoes on the right. The goggles are labeled with various parts: Adjustable Arm(s) (or Temple), Top Shield, Frame, Bridge, Anti-fog Impact-resistant Lens(es), Lens Marking, and Side Shield(s). The shoes are yellow with black soles and laces.</p> <p>Goggle                      Safety shoes</p>	
1A-d	<p><b>Assessment, maintenance and replacement of personal protective equipment:</b></p> <ol style="list-style-type: none"><li>1. The employer is obliged to maintain the equipment provided or replace equipment that becomes worn or defunct. Hard hats, being made of plastic will deteriorate over time. Their age of life expectancy will be advised by the maker so that the employer can budget and arrange to have them replaced at the end of their life.</li><li>2. Some personal protective equipment is for on-off use, eg. Paper boiler suits, disposable gloves or disposable respiratory protective equipment such as face masks.</li><li>3. Some equipment will have a life expectancy of a few years. If this is the case then employers should arrange for it to be adequately cleaned and sterilized so as to reduce cross infection between users.</li><li>4. Non disposable equipment must be stored in adequate accommodation to protect it from deterioration, damage, or harmful effects such as damp, sunlight, fungal attacks or general abrasion.</li></ol>	4



WINTER-16 EXAMINATION  
Model Answer

Subject code 17558

1-B	Any 1	6
1B-a	<p><b>Sources of radiation hazard:</b></p> <p><b>Natural sources:</b></p> <p>They are mainly of cosmic radiation received from from the space, and the naturally occurring radioisotopes present in the environment and those contained within the body of the organisms.</p> <p>Another source is the presence of radionuclides in the lithosphere, hydrosphere and atmosphere.</p> <p><b>Man made sources:</b></p> <ol style="list-style-type: none"><li>1. Nuclear weapons</li><li>2. Atomic reactors and nuclear fuel</li><li>3. Radioactive isotopes</li><li>4. Hospital (X-ray division)</li></ol> <p>The radiation is produced when atoms of natural radio active material decay or split, generating streams of photons vibrating at enormous speeds in wavelike form. Radiation has two basic forms: ionizing and nonionizing. In chemical plants workers may be exposed to various forms of nonionizing radiation. Radiation hazards occurred during testing of nuclear weapons, establishment of nuclear power plants, mining and refining of plutonium and thorium and preparation of radioactive isotope.</p> <p><b>Control of radiation hazard:</b></p> <p>All low or high level wastes have tremendous capacity to pollute the environment. As low level wastes are often produced in large quantities, their</p>	3
		3



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<p>containment is not possible. They are visually subjected to a treatment for removal of radioactivity and then discharged in the water bodies or on land in usual way. High level waste cannot be disposed off freely in the environment, but have to be concentrated, contained and stored out of the reach of human environment. The radioactive waste concerned with water pollution are usually in liquid or solid state. These different kinds of waste pose various problems, as disposal techniques suitable for one kind may be risky for other. All techniques however have a single goal that radioactive constituents of waste are not allowed to cause harm to organisms and in particular human.</p>	
1B-b	<p><b>Factors to be considered for selection of proper respiratory devices :</b></p> <ul style="list-style-type: none"><li>i) The nature of the hazardous operation or process.</li><li>ii) Type of the contaminant and its properties.</li><li>iii) Duration for which the protection will be needed.</li><li>iv) Location of the hazardous area.</li><li>v) State of health of the personnel involved.</li><li>vi) Functional and physical characteristics and limitation of the protective devices available.</li></ul>	1 mark each
2	Any 4	16
2-a	<p><b>Precautions taken against electrical hazards:</b></p> <p>The danger of injury through electrical shock is present whenever electrical power is used.</p> <ul style="list-style-type: none"><li>1. All electrical should be adequately insulated, grounded or isolated to prevent bodily contact with any source of dangerous potentials.</li><li>2. To prevent electrical shock, ensure that all equipment are properly</li></ul>	1 mark each for any 4



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<p>grounded.</p> <ol style="list-style-type: none"><li>3. To reduce the risk of shock, do not contact any electrical components, and keep the work area dry.</li><li>4. Check all equipment regularly and wear the proper protective equipment when working with high voltages or currents.</li><li>5. The primary effects of electrical shock are due to current actually flowing through the body. Electrical burns occur when the body completes a circuit connecting the power source with the ground. Although the resistance of dry, unbroken skin to electrical current is relatively high, the amount of current necessary to kill a person is small. Therefore it is easy to exceed lethal levels of current flow, especially if the skin is broken, wet or damp with sweat.</li></ol>	
2-b	<p><b>Different breathing and respiratory protection equipments:</b></p> <ol style="list-style-type: none"><li>1. Air Purifying Type<ol style="list-style-type: none"><li>a. Mechanical filter respirators:</li><li>b. Canister gas masks:</li><li>c. Chemical Cartridge Respirators:</li></ol></li><li>2. Air Supplied Type:<p>This includes-</p><ol style="list-style-type: none"><li>a. Air line respirators:</li><li>b. Fresh air or Suction Hose Masks:</li></ol></li><li>3. Self Contained Breathing Apparatus:<p>These are mainly of three types.</p><ol style="list-style-type: none"><li>a. With compressed air or oxygen cylinder</li></ol></li></ol>	1 mark each



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<p>b. Oxygen rebreathing or recirculating type</p> <p>c. Oxygen regenerating type</p>	
2-c	<p><b>Safety audit</b> is essential to determine the company's safety and is a proactive process by which an organization is able to continually evaluate and monitor the progress of its safety and health programs. Safety audit involves the examination and qualitative assessment of all activities such as research and development, design, occupational health and hygiene, environmental control, products and processes, storage and transportation, labeling and packing, operational measures, maintenance, housekeeping and training. Auditing will promote contact with individual workers as a manifestation of the management interest and concern relating to safety. It is also essential that an appropriate member of the management is directly involved in auditing and implementation of the audit report. Audits are designed to rate an organization's total safety and health program, identify its strength and weakness, show where improvement are needed, and obtain commitment and target dates for correcting problems</p> <p><b>Benefits of Safety Audit (any 2)</b></p> <p>i) Safety audit can be used by management to uncover safety and health problems before personal injuries, property damage, or business interruptions occur.</p> <p>ii) A safety audit also serves as a visible process that management can execute to demonstrate to employees that they are interested in their safety.</p> <p>iii) A safety audit uncovers unsafe conditions and poor work practices, which are the principal causes of accident.</p>	<p>2</p> <p>1 mark each</p>





**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<p>iv) Safety audit can reduce illness and injuries, and associated medical, insurance and litigation.</p> <p>v) Safety audit can improve business operation. It can maintain, and in some instances, increases productivity, by reducing interruptions caused by accidents.</p> <p>vi) Safety audit identifies conditions where machinery, equipment or tools need repair or replacement, thus increasing the efficiency of the business operation.</p>							
2-d	<p><b>Batch weighing and continuous weighing:</b></p> <p><b>Batch weighing:</b> In batch weighing a given unit of weight is measured and then the desired total weight is obtained through multiples of the given unit. Batching scales find use when small weighings are carried out either singly or a few in sequence. Principle of this type is based on the concept that a flowing stream of material has constant density. Feed conditions are important and uniform flow is essential for accurate weighing.</p> <p><b>Continuous weighing:</b> This procedure involves a device that is sensitive both to the total amount of material flowing and to changes in the flow. The material is continuously brought over the weigh sensing elements of the continuous weigh scale, which is capable of keeping track of the flow and its changes and eventually accounts for these when totaling them. Continuous weighing scale use a section of a belt conveyor, over which the material to be weighed passes.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 50%;">Batch</td> <td style="width: 50%;">Continuous</td> </tr> <tr> <td>A given unit of weight is measured</td> <td>Continuous weighing is done</td> </tr> <tr> <td>Used when small weighings are carried out</td> <td>Used when large volume is to be weighed.</td> </tr> </table>	Batch	Continuous	A given unit of weight is measured	Continuous weighing is done	Used when small weighings are carried out	Used when large volume is to be weighed.	1 mark each
Batch	Continuous							
A given unit of weight is measured	Continuous weighing is done							
Used when small weighings are carried out	Used when large volume is to be weighed.							



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<table border="1"><tr><td>Feed conditions are important</td><td>Feed conditions are not that important</td></tr><tr><td>Uniform flow is essential</td><td>Uniform flow is not essential</td></tr><tr><td>It is based on the concept that a flowing stream of material has constant density.</td><td>No such assumption is made</td></tr></table>	Feed conditions are important	Feed conditions are not that important	Uniform flow is essential	Uniform flow is not essential	It is based on the concept that a flowing stream of material has constant density.	No such assumption is made																																			
Feed conditions are important	Feed conditions are not that important																																									
Uniform flow is essential	Uniform flow is not essential																																									
It is based on the concept that a flowing stream of material has constant density.	No such assumption is made																																									
2-e	<p><b>Technical specification of foam type fire extinguisher:</b></p> <table border="1"><thead><tr><th>TYPE</th><th>2lit. foam spray S/P</th><th>6 lit. foam spray S/P</th><th>9lit. foam spray S/P</th></tr></thead><tbody><tr><td>Capacity(lit)</td><td>2</td><td>6</td><td>9</td></tr><tr><td>Fire rating</td><td>8A 55B</td><td>13A 144B</td><td>21A 183B</td></tr><tr><td>Height (mm)</td><td>395</td><td>565</td><td>600</td></tr><tr><td>Cylinder diameter</td><td>112</td><td>160</td><td>189</td></tr><tr><td>Overall width (mm)</td><td>150</td><td>290</td><td>300</td></tr><tr><td>Filled weight(kg)</td><td>3.81</td><td>10.09</td><td>14.21</td></tr><tr><td>Range of throw(m)</td><td>&gt;2</td><td>&gt;4</td><td>&gt;4</td></tr><tr><td>Working pressure at 20°C</td><td>15</td><td>15</td><td>15</td></tr><tr><td>Temperature range( °C)</td><td>0 to 60</td><td>0 to 60</td><td>0 to 60</td></tr></tbody></table>	TYPE	2lit. foam spray S/P	6 lit. foam spray S/P	9lit. foam spray S/P	Capacity(lit)	2	6	9	Fire rating	8A 55B	13A 144B	21A 183B	Height (mm)	395	565	600	Cylinder diameter	112	160	189	Overall width (mm)	150	290	300	Filled weight(kg)	3.81	10.09	14.21	Range of throw(m)	>2	>4	>4	Working pressure at 20°C	15	15	15	Temperature range( °C)	0 to 60	0 to 60	0 to 60	4
TYPE	2lit. foam spray S/P	6 lit. foam spray S/P	9lit. foam spray S/P																																							
Capacity(lit)	2	6	9																																							
Fire rating	8A 55B	13A 144B	21A 183B																																							
Height (mm)	395	565	600																																							
Cylinder diameter	112	160	189																																							
Overall width (mm)	150	290	300																																							
Filled weight(kg)	3.81	10.09	14.21																																							
Range of throw(m)	>2	>4	>4																																							
Working pressure at 20°C	15	15	15																																							
Temperature range( °C)	0 to 60	0 to 60	0 to 60																																							
3	Any 4	16																																								
3-a	<p><b>Methods for controlling noise in industry:</b></p> <p><b>i) Reduction at source:</b> wherever possible it would be advisable to reduce the noise at the source itself.eg change the bearings if it makes noise due to wear.</p> <p><b>ii) Vibration isolation:</b> In case of machine like reciprocating compressors and</p>	1 mark each for any 4																																								



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<p>power presses, the mechanical vibrations are transmitted through the structures, walls and the floor which increases the noise level at the workplace. Reduction of noise levels can be achieved by,</p> <p>a) Using vibration resilient mounts to fix the machine to foundations.</p> <p>b) Special heavy foundations with a large weight compared to the weight of machine.</p> <p><b>iii) Vibration Damping:</b> Machine parts, ventilation duct cause noise in this manner. The noise in these cases can be reduced by damping- by stiffening the member.</p> <p><b>iv) Silencers:</b> Where noise due to movement of gases or air is the problem, silencers are the right solution. Silencers can be used at the inlet/outlet of compressors, exhausts, release of steam and gases and pressure relief valves of pneumatic machines.</p> <p><b>v) Noise insulation:</b> It may be necessary to insulate the source from all the sides although insulating two or three sides also give reduction of a lower degree.</p> <p><b>vi) Noise absorption:</b> Noise absorption material, normally soft and porous, prevent reflection of noise and also convert some of the noise energy into heat energy.</p>	
3-b	<p>The storage bins are generally classified based upon flow pattern of the bulk material discharged, as</p> <p><b>i) core flow (funnel flow or plug flow</b></p> <p><b>ii) mass flow and</b></p> <p><b>iii) composite flow.</b></p> <p>A typical mass flow bins having basic conical and plane flow shapes. Mass</p>	4





**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 

17558
-------

	<ol style="list-style-type: none"><li>1. Ear :eg. Unusual sound coming out of rotating equipment.</li><li>2. Eye :eg. Excessive vibration of equipment or dislocation of moving part.</li><li>3. Touch :eg. Excessive temperature of equipment.</li><li>4. Smell :eg. Unusual smoke coming out of equipment.</li></ol> <p><b>sensitive instruments adopted for predictive maintenance technique:</b></p> <ol style="list-style-type: none"><li>1. Audio gauges :eg. Unusual sound coming out of rotating equipment.</li><li>2. Vibration analyser: eg. Excessive vibration of equipment</li><li>3. Amplitude meter:eg. Excessive temperature of equipment.</li><li>4. Pressure, temperature and resistance strain gauges: eg. Excessive temperature of equipment..</li></ol>	1
3-e	<p><b>Importance of record keeping in preventive maintenance:</b></p> <p>It is very essential to keep records as they are the only reliable guides to measure the effectiveness of the preventive maintenance programme. Records give an idea regarding situation at present and where it is going. Good, updated records is very important in preventive maintenance programme.</p> <p><b>Benefits:</b></p> <p>Record keeping is also helpful:</p> <ol style="list-style-type: none"><li>1. When budgeting for major overhauls.</li><li>2. For finding equipment reliability</li><li>3. For determining frequency of inspection</li><li>4. To prepare maintenance schedule</li><li>5. To predict equipment life</li><li>6. For equipment replacement analysis</li></ol>	1  1 mark each for any 3

**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	7. To carry out cost reduction studies	
4-A	Any 3	12
4A-a	<p><b>Pull push pneumatic conveying system:</b></p> <p>Pull push pneumatic conveying system are useful for collecting bulk solid from various locations and redistributing them to several delivery points.</p> <p><b>Fig. Combined Positive/Negative Pressure System</b></p>	<p>1</p> <p>3</p>
4A-b	<p><b>Tensioners with belt conveyers:</b></p> <p>For any but the shortest conveyors, changes in load or in weather, especially in temperature and humidity result in variation in belt length of sufficient magnitude to give an uneven tension if there is no provision for keeping the belt taut. Accordingly, tensioners or take up must be installed to maintain an even tension on the belt under all conditions. Belt tensioners are essential with belt conveyors to held the belt in tension, that minimizes creeping of belt under varying tension.</p>	4





**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

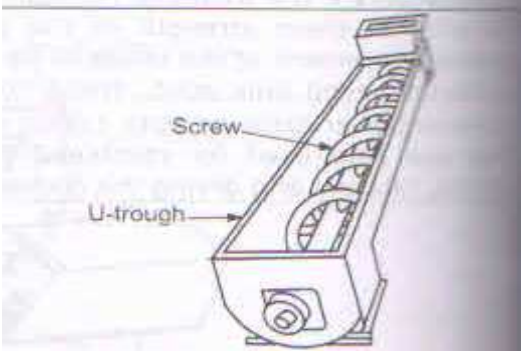
	Class	Description	Suitable type of extinguishes	
	A	Fires involving ordinary combustion materials like wood , paper, cloth etc where effect of water is essential to extinguish.	Soda acid	
	B	Fires in flammable liquids like oil, solvents, petroleum prod, varnish paint where blanketing effect in essential	Foam , CO <sub>2</sub> , gas, dry chemical powder	
	C	Fires involving gaseous substances under pressure where it is necessary to dilute burning gas at a very high rate with an inert gas or powder.	CO <sub>2</sub> Gas, chemical powder	
	D	Fires involving metal like Mg, Al K etc. where its burning is reacting to water and which require special extinguishing media or technique	Special powder	
	E	Fires involving electrical equipment where the electrical non conductivity of the extinguishing media is of prime importance	CO <sub>2</sub> , gas, dry chemical powder but when the electrical equipments are used. Even soda acid or foam is suitable.	
4-B	Any one			6
4B-a	<b>Construction of screw conveyor:</b> The screw conveyor has helical steel flights cut from flat sheet as circular rings, split on one side and with the two edges then pulled apart to form one helical section of the screw. Number of such sections are riveted together to form a continuous helix of the required length. Now a day, helicoid flight are used, which are formed by rolling a continuous strip of steel into a helix. Fig. shows screw conveyor using a U-trough inside which a helical screw			2





WINTER-16 EXAMINATION  
Model Answer

Subject code 17558

	<p>mounted in the bearings which are located at the ends of the trough.</p>  <p><b>Figure: Screw Conveyor</b></p> <p><b>Working of screw conveyor:</b></p> <p>In screw conveyor as screw rotates in the material to be conveyed, the flight advances horizontally into a heap of bulk solid, and thus material is lifted by wedging action. The cylindrical casing resists the rotation of the particulate material in the conveyor. Thus material advances by combination of trumbling and shearing action.</p>	<p>2</p> <p>2</p>
4B-b	<p><b>Procedure of safety Auditing :</b></p> <p>Safety audit is carried out by a team whose members are not involved in the plant or activity being audited. The expertise of the team should be compatible with the type of audit. It is beneficial to include the managers of other plants or units in an audit team as well as one previous auditor of the same unit. Audits are carried out in a formal way using a carefully drawn up checklist of items and descriptive standards for each item. A line manager or supervisor of the plant under audit should be asked to accompany the auditor inspecting it. He</p>	<p>6</p>



**WINTER-16 EXAMINATION**  
**Model Answer**

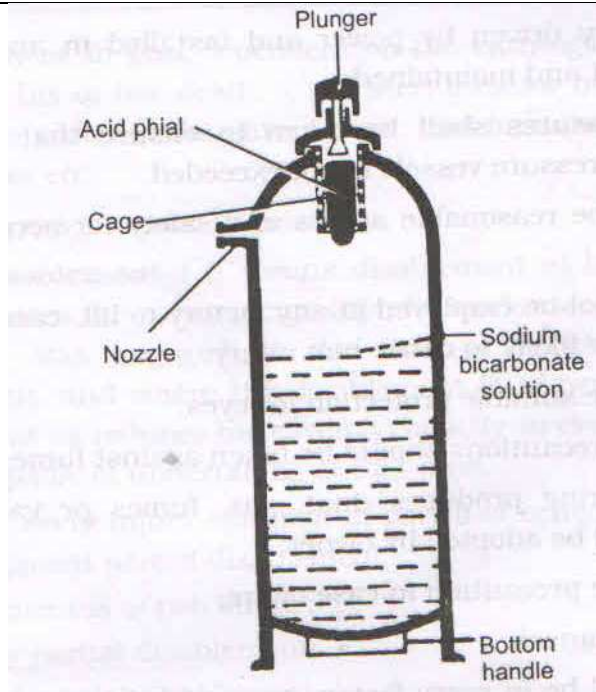
Subject code 17558

	<p>should be informed of all corrections and improvements required by the auditors so that he can start taking the necessary steps before the audit report is submitted to management. The main object of inspection should be to determine whether the layout design and condition of equipment and protective features are upto standard and to ensure that the protective features will work in an emergency. The auditing should give a verbal report to the management on completion of audit followed by a clear and concise written report within two weeks.</p> <p>The main aspects of safety audit are:</p> <ul style="list-style-type: none"><li>i) Identification of possible hazardous situation</li><li>ii) Assessment of consequences associated with these hazards</li><li>iii) Selection of measures to minimize consequences.</li><li>iv) Implementation of these measures within the organization</li><li>v) Monitoring and documentation of the changes.</li></ul> <p>The methodology generally accepted and adopted for safety audit is the preparation and submission of a questionnaire or checklist to the plant management</p>	
5	Any 2	16
5-a	<b>Dry chemical fire extinguisher:</b>	2 mark for diagram, 3 marks for



WINTER-16 EXAMINATION  
Model Answer

Subject code 17558



constructi  
on, 3  
marks for  
working

**Construction:**

These are gas cartridge type and are activated by a plunger and controlled by a simple squeeze grip action thus enabling the discharge of the dry chemical powder, generally sodium or potassium bicarbonate base or ammonium phosphate base. To operate, remove the safety clip and press puncturing lever down. This will release  $\text{CO}_2$  gas from the cartridge and pressurize the chamber containing dry chemical. The discharge is controlled by the nozzle located at the end of the hose.

**Working :** On fires involving either liquids in containers or spilled liquids, direct the jet towards the near edge of the fire and with rapid sweeping motion, drive the fire towards the far edge until all the flames are extinguished. On fires in falling liquids, direct the jet at the base of the flame and sweep upwards. On



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	fires in electrical equipments, direct the jet straight at the fire. Where the equipment is closed, direct the jet into any opening with the object of penetrating the interior.	
5-b	<p><b>Plant maintenance Scheduling</b> involves determining calendar inspection dates that will fulfill the frequency requirements in the most efficient way. Schedules should be set in consultation with production department and as per production needs. Maintenance schedule follows similar procedure to that outlined for production. It is desirable to know time duration required for job, this helps us to plan its start. Scheduling system should be clear, precise and ease to operate. It should be based upon accurately determined time standards. It should be finalized in consultation with production department so that the equipments for maintenance purpose can be spared. It should be flexible.</p> <p>Maintenance schedule should:</p> <ul style="list-style-type: none"><li>Be such that the maintenance work can be carried out during lunch hours, between shifts or at week ends.</li><li>Take advantage of planned stoppage such as tool change, loading and unloading of job etc.</li><li>Plan major repairs and overhauls during holidays</li><li>Make use of reserve plants if the need arises.</li></ul> <p><b>Importance of Plant maintenance Schedule in a chemical plant :</b></p> <ul style="list-style-type: none"><li>i) It reduces the overall cost of production</li><li>ii) It protect man and machinery in a plant</li></ul> <p><b>Procedure:</b></p>	4



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 17558

	<p>The steps are:1) preparation of master maintenance schedule 2) Preparation of detailed weekly or daily schedule.</p> <ol style="list-style-type: none"><li>1. Master schedule indicates the nature and magnitude of each repair and construction task segment of maintenance for a specified time span.</li><li>2. Considering total man hours needed for each task segment and manpower available, the distribution of job is done.</li><li>3. A master schedule is flexible and space always exist to accommodate unanticipated task and jobs which are lagging behind schedule.</li><li>4. Detailed schedules are prepared by breaking overall time span allocated under master schedule. Detailed weekly work schedule provides information to each craft and shop regarding the task to be carried on each job for each day in the coming week.</li><li>5. Detailed schedule should be flexible and able to accommodate emergency jobs. It may be issued to concerned persons every day or near the week end.</li><li>6. Maintenance schedule of each machine may be prepared and it will indicate the list of work which must be carried out together with frequency and will comprise of servicing, adjustments, lubrication details and particulars of replacement work.</li></ol>	4
5-c	<p><b>Preventive maintenance :</b></p> <p>A system of scheduled, planned or preventive maintenance tries to minimize the problem of breakdown maintenance. It is a stitch-in-time procedure. It locates weak spots (such as bearing surface, parts under excessive vibrations etc.) in all equipments, provides them regular inspection and minor repairs thereby reducing the damage of unanticipated breakdowns. The principle of</p>	4



WINTER-16 EXAMINATION  
Model Answer

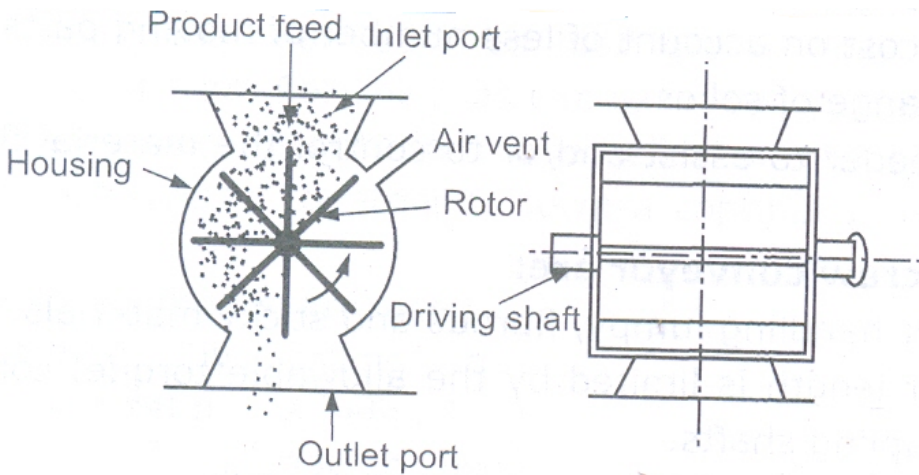
Subject code 17558

<p>preventive maintenance is that prevention is better than cure.</p> <p>Advantages :</p> <ol style="list-style-type: none"><li>1. Reduced break down and connected down time.</li><li>2. Lesser odd time repairs and reduced over time to be maintenance work force.</li><li>3. Greater safety for workers.</li><li>4. Fewer large scale and repetitive repairs.</li><li>5. Low maintenance and repair cost.</li><li>6. Less stand by or reserve equipment and spare parts.</li><li>7. Identification of equipment requiring high maintenance cost.</li><li>8. Lower unit cost of manufacture.</li><li>9. Increased equipment life.</li><li>10. Better product quality.</li></ol> <p><b>Preventive maintenance technique for moving equipments:</b></p> <ol style="list-style-type: none"><li>1. Periodic inspection of moving equipment and machinery to uncover conditions that lead to production breakdown and harmful depreciation. The key to all good preventive maintenance programmes is inspection.</li><li>2. Upkeep of moving equipment to correct such conditions while they are still in a minor stage.</li><li>3. Moving equipment are prone to wear and tear, therefore periodic inspection detects the most vulnerable part and help the maintenance department to do the maintenance work.</li><li>4. This also helps to apply lubrication to the moving parts, thus helps in smooth function.</li></ol>	4
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---



WINTER-16 EXAMINATION  
Model Answer

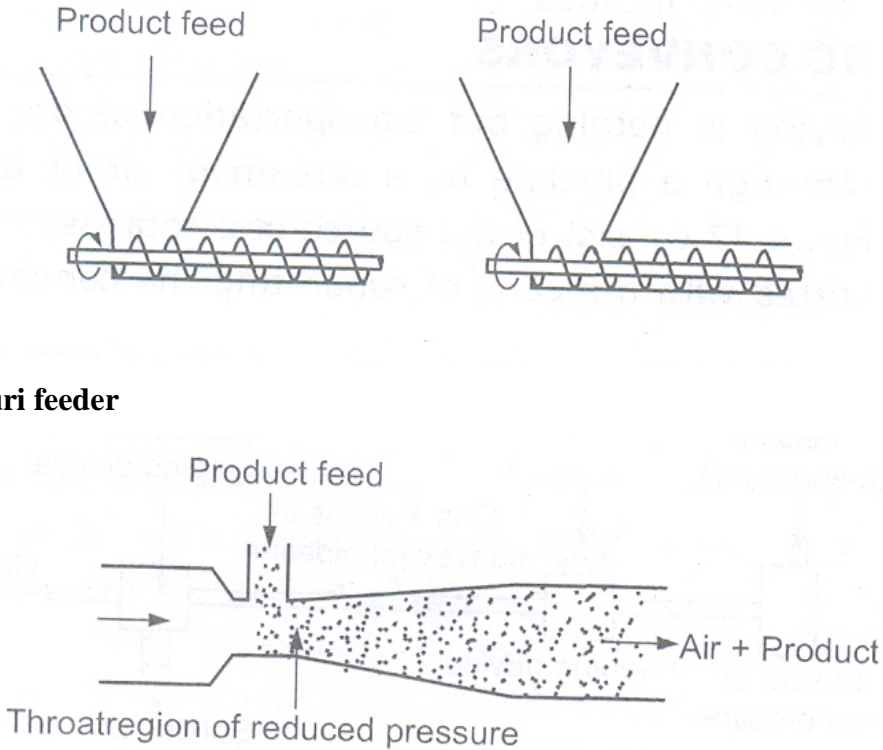
Subject code 17558

	5. Preventive maintenance helps to maintain the moving equipment in good working condition.	
6	<b>Any 2</b>	16
6-a	<p><b>Material feeding device is essential with Positive Pressure or Vacuum Systems:</b></p> <p>In this system, air or suitable gas is blown along a pipeline, which carries the bulk solid to be conveyed. Fan or blower is used to deliver air into the pipeline. Feeders are used to introduce the material into the pipeline against the conveying gas pressure. The feeder must be capable of introducing the bulk solid reliably at a constant rate and air leakage at the feed point should be minimized.</p> <p><b>Star feeder</b></p>  <p><b>Screw feeder</b></p>	2



WINTER-16 EXAMINATION  
Model Answer

Subject code 17558

	 <p><b>Venturi feeder</b></p>	2
6-b	<p><b>Types of maintenance:</b></p> <ol style="list-style-type: none"> <li>1. Corrective or breakdown maintenance</li> <li>2. Scheduled maintenance</li> <li>3. Preventive maintenance</li> <li>4. Predictive maintenance</li> </ol> <p><b>Shut down maintenance of sugar industry:</b></p> <p>Since sugar is a seasonal crop, in sugar industry shut down maintenance is done, once the sugar cane supply is over.</p> <p>Different equipment for which maintenance is done are</p>	4





**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 

17558
-------

	<ul style="list-style-type: none"><li>i) Shredder and Cane crushing mill: Cleaning and maintenance for wear and tear of cane crushing mill is needed.</li><li>ii) Boiler: All boiler mountings and accessories are to be checked for its proper functioning.</li><li>iii) Evaporators and Crystallizer: Instrumentation and control system should be checked.</li><li>iv) Electrical Equipment : Proper Insulation should be done and leakage should be prevented</li></ul>	
6-c	<p><b>Functions and responsibilities of plant maintenance department:</b></p> <p>1)Inspection 2)Engineering 3) Maintenance 4) Repair 5) Overhaul 6)Construction 7) Salvage 8) Clerical work</p> <p><b>1)Inspection:</b></p> <ul style="list-style-type: none"><li>i) Inspection of the plant facilities to examine their condition and to check for repairs needed.</li><li>ii) Inspection to ensure the safe and efficient operation of plant equipment and machinery.</li></ul> <p><b>2)Engineering :</b></p> <ul style="list-style-type: none"><li>i) Engineering involves alternations and improvement in existing plant equipment to minimize breakdown.</li><li>ii) Engineering and consulting services to production supervision.</li></ul> <p><b>3) Maintenance :</b></p> <ul style="list-style-type: none"><li>i) Maintenance of existing plant equipment.</li><li>ii) Engineering and execution of planned maintenance, minor installations of equipment building and replacements.</li></ul>	1 mark each



**WINTER-16 EXAMINATION**  
**Model Answer**

Subject code 

17558
-------

	<p><b>4) Repair:</b></p> <p>i) To carry out corrective repair to alleviate unsatisfactory conditions found during preventive maintenance inspection.</p> <p><b>5) Overhaul:</b></p> <p>i) Overhaul is a planned, scheduled reconditioning of plant facilities such as machinery etc.</p> <p>ii) Overhaul involves replacement, reconditioning, reassembly, etc.</p> <p><b>6) Construction :</b></p> <p>i) In some organization, maintenance department is provided with equipment and personnel and it takes up construction job too.</p> <p><b>7) Salvage :</b></p> <p>i) Maintenance department may also handle disposition of scrap or surplus materials.</p> <p><b>8) Clerical work:</b></p> <p>i) Maintenance department keeps records at i) of costs, ii) of time progress on jobs pertaining to important features of building and production equipment.</p>	
--	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--