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SET 1

Scoring Indicators

COURSE NAME : MATERIAL HANDLING

Course Code 5023B

QID : 2109230042

Q No	Scoring Indicators	Split score	Sub Total	Total score
PART A				9
I. 1	Material handling refers to activities, equipment, and procedures related to the moving, storing, protecting and controlling of materials in a system.	1	1	
I. 2	Unit load is the material handling term for any configuration of materials that allow it to be moved by material handling equipment as a single unit	1	1	
I. 3	Welded load chains, Roller chains, Hemp ropes and Steel wire ropes.	(1/4)x4	1	
I. 4	Winch is an equipment for pulling a heavy load by winding one or two ropes on a rope drum.	1	1	
I. 5	(A) Hooks ,(B) Grabs of different types, (C) Grab buckets for bulk load, (D) Ladles for liquid materials ,(E) Electrical lifting magnets , (F) Vacuum lifter. etc.	Any two (1/2)x2	1	
I. 6	Conveyors which are driven with the help of power known as traction conveyors.	1	1	
I. 7	Gravity type conveyors, Vibrating & Oscillating conveyors, Screw conveyors, Pneumatic & Hydraulic conveyors	Any two (1/2)x2	1	
I. 8	Lever operated hoist, Differential hoists, Worm geared and Spur geared hoists .	Any two (1/2)x2	1	
I. 9	As the name suggests a revolving crane swings the load through 360 degree. Revolving cranes are of different varieties. They can have basically 3 or 4 degrees of freedom.	1	1	

PART B				
II. 1	<p>A . Horizontal flow line. a) I-flow or Line flow b) L-flow c) U-flow d) S-flow e) O-flow</p> <p>B. vertical flow lines a) Processing downward and upward b) centralized or decentralized elevation c) Unidirectional or Retractorial flow d) vertical or inclined flow</p>	3	3	24
II. 2	<p>Palletizing is the process of stacking large quantities of identical items onto a pallet for shipping. Items are stacked according to weight and in a pattern that promotes stability and product integrity. The palletizing method enables you to stack multiple items in a single bundle, based on volume or weight. In addition to providing better product protection, it can also reduce shipping costs.</p>	3	3	
II. 3	<p>They are widely used in hoisting equipments as flexible members. It creates a high-strength chain for heavy-duty use. Welded chain is stronger than a non-welded chain, so it is typically used for overhead lifting and tow applications. It is made of steel or stainless steel and is coated with a vinyl sleeve. They are employed for low capacity hoisting machines (hoists, winches, hand-operated cranes, etc)</p>	3	3	
II. 4	<p>(A) Hooks (B) Grabs of different types (C) Grab buckets for bulk load (D) Ladles for liquid materials (E) Electrical lifting magnets (F) Vacuum lifter.</p>	(1/2)x6	3	
II. 5	<p>A brake is a mechanical device that inhibits motion by absorbing energy from a moving system. It is used for slowing or stopping of moving vehicle, wheel axle or to prevent it's motion, most often accomplished by means of friction. In hoisting machinery, brakes are employed for controlling the speed of load lowering and holding the suspended load at rest.</p>	3	3	

II. 6	<p>Capstan, is a mechanical device used chiefly on board ships or in shipyards for moving heavy weights by means of ropes, cables, or chains. Capstans also have been used in railroad yards for spotting (positioning) freight cars. A capstan consists of a drum, driven either manually or by steam or electricity, that rotates about a vertical axis to wind in a line (rope, cable, or chain) that has been wrapped around it .</p>	3	3	
II. 7	<p>Automated guided vehicle systems (AGVs), usually known as driverless vehicles, are turning out to be an important component of the automated manufacturing system</p> <p>An automated guided vehicle system (AGVS) is a material handling system that uses independently operated, self-propelled vehicles guided along defined pathways. The vehicles are powered by on-board batteries that allow many hours of operation (8-16 hr. is typical) between recharging.</p> <p>The Automated Guided Vehicle belongs to a class of highly flexible, intelligent, and versatile material-handling systems used to transfer materials from various loading locations to various unloading locations throughout the facility.</p>	3	3	
II. 8	<p>A hydraulic conveyor is a type of mechanical system that utilizes pressurized fluids to move material along a path or route. It's used in production lines and other applications where materials must be moved at high speeds and with precision accuracy.</p> <p>A hydraulic conveyor is a type of material handling equipment that uses a hydraulic system to move materials from one place to another. Hydraulic conveyors are often used in applications where high weights need to be moved with minimal downtime, such as in factories or warehouses.</p>	3	3	
II.9	<p>Rotary cranes, Mobile cranes, Bridge cranes, cable crane, Floating crane, Jib crane, Derrick crane, Overhead and Gantry cranes</p>	Any six (1/2)x6	3	

II.10	<p>A freight elevator is an elevator designed to carry goods, rather than passengers. Freight elevators are typically larger and capable of carrying heavier loads than a passenger elevator, generally from 2,300 to 4,500 kg capacity. Freight elevators may have manually operated doors, and often have rugged interior finishes cab to prevent damage while loading and unloading. Both traction and hydraulic freight elevators exist. These elevators are specially constructed to withstand the rigors of heavy loads.</p>	3	3	
PART C				42
III.	<p>1.Storage and handling equipment, 2.Bulk material handling equipment, 3.Engineered systems and 4.Industrial trucks.</p> <p style="text-align: center;">Storage and Handling Equipment</p> <p>This is the simplest type, something so basic you might not even think of it as equipment. These are shelves and racks where you store your material in between receiving it and shipping it. They are often designed to utilize vertical space so the warehouse can hold more items. Bins, drawers, stacking frames, flow racks, cantilever racks, and mezzanines are also included in this category.</p> <p style="text-align: center;">Bulk material handling equipment</p> <p>Bulk material handling equipment covers equipment that transports, stores and controls bulk materials. Generally, manufacturers design bulk handling material equipment to move and store materials in a loose form. It can find these pieces of equipment handling food, liquid, metal items and minerals.</p> <p style="text-align: center;">Engineered systems.</p> <p>Engineered systems refer to automated bulk material handling equipment made to help transport and store materials. Usually, automated systems feature several pieces of equipment. They're very popular since they remove the need for manual labor to complete various tasks.</p> <p style="text-align: center;">Industrial trucks</p> <p>Industrial trucks cover a wide swath of equipment, and they're all designed to assist with material transportation. These industrial trucks can range from small, hand-operated</p>	7	7	7

	equipment to large, driveable equipment. Generally, you can break industrial trucks down into two main categories: non-stacking and stacking trucks. Non-stacking trucks are solely designed for transportation while stacking trucks can also load materials and stack them.			
IV.	Properties of the material, Layout and Characteristics of the building, Production flow, Cost considerations , Nature of operations, Engineering factors ,Equipment reliability.	(1x7)	7	7
V.	<p>In hoisting equipment, use of arresting gears or brakes is of paramount importance to prevent the raised load from getting lowered of its own weight, when the raising effort is withdrawn. Arresting gear is used to hold the load lifted by hoisting equipment</p> <p>Ratchet Gearing</p> <ul style="list-style-type: none"> • Ratchet gearing consists of ratchet gear and pawl. <p>The teeth in the ratchet (internal teeth or external teeth) and so arranged that the ratchet gear runs free when the load is being raised. The pawl engaging the ratchet assist its motion when the load is being lowered.</p>	3+4	7	7
VI.	<p>Electromagnetic brakes are also called electro-mechanical brakes or EM brakes. They slow or stop motion using electromagnetic force to apply mechanical resistance, or friction. An electrical current goes through a coil on the brakes to create a magnetic field strong enough to move an armature on or off a magnetic face.</p> <p>There are two armatures i.e. inner armature and outer armature and coil also. When electric power will be supplied, the coil will be energized and there will be produced magnetic field and both armatures will be attracted with each other due to produced magnetic field and therefore torque spring will be compressed. As torque spring will be compressed and armatures will be attracted with each other, Brake show will move away from brake drum and brake drum will be able to rotate When power supplied will be off, in that situation coil</p>	7	7	7

	<p>will be de-energized and hence compressed torque spring will come in its original position and simultaneously both armatures will be separated with each other and therefore brake shoe will be pressed against brake drum and brake drum rotation will be stopped. Let us consider the operation of DC electromagnetic brake in EOT crane, Toque spring of DC electromagnetic brake will provide the ability to EOT crane to hold the load at any point.</p>			
VII.	<p>One of the most efficient ways to elevate bulk materials vertically is with a bucket elevator. A Bucket Elevator consists of a series of buckets attached to a belt or chain with pulleys or sprockets located at the top and bottom of the unit. The buckets are located in a casing or housing to contain the material. Bulk materials are loaded into each bucket as the bucket moves past an inlet point.</p> <p>Bucket elevators are broadly classified into two general types;</p> <ol style="list-style-type: none"> 1) spaced bucket elevators and 2) continuous bucket elevators. <p>The spaced bucket elevators are further classified as;</p> <ol style="list-style-type: none"> a) Centrifugal discharge elevators b) Positive-discharge elevators c) Marine leg elevators and d) High-speed elevators. <p>The continuous bucket elevators are classified as;</p> <ol style="list-style-type: none"> a) Super capacity bucket elevators and b) Internal-discharge bucket elevators. 	7	7	7
VIII.	<p>A screw conveyor consists of a continuous or interrupted helical screw fastened to a shaft which is rotated in a U-shaped trough to push fine grained bulk material through the trough. The bulk material slides along the trough by the same principle a nut prevented from rotating. The bulk material moves in a rotating screw. The load is prevented from rotating with screw by the weight of the material and by the friction of the material against the wall of the trough.</p> <p>A screw conveyor is suitable for any pulverized or granular non viscous material, and even at high temperature. The conveyor is particularly suitable for mixing or blending more than one material during transportation, and also for controlling feed rate of materials in a processing plant. Abrasion and consequently certain amount of degradation of the material is unavoidable, hence it is not suitable for brittle and high abrasive materials. It is also not suitable for large-lumped, packing or sticking</p>	7	7	7

	materials.			
IX.	<p>A chain conveyor is a type of conveyor system for moving material through production lines. Chain conveyors utilize a powered continuous chain arrangement, carrying a series of single pendants. The chain arrangement is driven by a motor, and the material suspended on the pendants are conveyed. Chain conveyors are used for moving products down an assembly line and/or around a manufacturing or warehousing facility.</p> <p>Chain conveyors are primarily used to transport heavy unit loads, e.g. pallets, grid boxes, and industrial containers. These conveyors can be single or double chain strand in configuration. The load is positioned on the chains, the friction pulls the load forward.</p> <p>Chain conveyors are generally easy to install and have very minimum maintenance for users.</p>	7	7	7
X	<p>Roller Conveyor is a type of Conveyors with a series of rollers supported in a frame over which objects are advanced manually, by gravity, or by power. A roller conveyor is a conveyor that consists of a series of parallel rotating bars that move goods along to their end destination. Roller conveyors are used in environments like warehouses and manufacturing facilities. These conveyors are containing sprocket at one terminal and a bearing housing at other. A roller shaft runs through the rollers, which are mounted on the extruded aluminum rails.</p> <p>Roller conveyors are the proper choice when you need to side load, push off, accumulate a product or adjust pressure on carrying rollers. Roller conveyor types are chain driven, belt driven, line shaft driven, accumulation, or non-powered (gravity). Using roller conveyors instead of slider bed conveyors adds versatility to the type of transfers, diverters and stops that can be used in a system. Rollers are available in mild steel, galvanized, plastic or stainless steel.</p>	7	7	7
XI.	<p>A hoist is a device used for lifting or lowering a load by means of a drum or lift-wheel around which rope or chain wraps.</p> <p>Lever operated hoist, Differential hoists, Worm geared and</p>	Defn:1 +	7	7
		Explain		

	<p>Spur geared hoists</p> <p>A Lever Hoist</p> <p>A Lever Hoist is a piece of high-quality equipment used to lift and lower heavy loads without the aid of machinery. Lever Hoists have the ability to lift items in most positions, including horizontally. Different from the Chain Block or Hoist, which can only lift items vertically, the Lever Hoist's ability to lift items horizontally is a great benefit.</p>	<p>any one 6</p>		
<p>XII.</p>	<p>A mobile crane is a cable-controlled crane mounted on crawlers or rubber-tired carriers or a hydraulic-powered crane with a telescoping boom mounted on truck-type carriers or as self-propelled models. They are designed to easily transport to a site and use with different types of load and cargo with little or no setup or assembly. Mobile cranes generally operate a boom from the end of which a hook is suspended by wire rope and sheaves. The wire ropes are operated by whatever prime movers the designers have available, operating through a variety of transmissions. Steam engines, electric motors, and internal combustion engines (IC) have all been used. Older cranes' transmissions tended to be clutches. This was later modified when using IC engines to match the steam engines' "max torque at zero speed" characteristic by the addition of a hydrokinetic element culminating in controlled torque converters.</p>	<p>7</p>	<p>7</p>	<p>7</p>
<p>XIII.</p>	<p>Stackers, Industrial lifts, Passenger lifts, hydraulic lift .</p> <p>Stacker</p> <p>The stacker is used for preparing the stockpile with the incoming material. The machine travels on rails with the material fed to it through the yard conveyor between the rails. It is provided with a boom with a belt conveyor which is moved up and down with the help of wire ropes or hydraulic system. Depending on the application, the entire boom system may also be slewed on the substructure which travels on wheels running on the rails. The material coming on the yard conveyor is raised</p>	<p>Types- 1/2x4= 2 Expln-5</p>	<p>7</p>	<p>7</p>

	<p>by a tripper attached to the stacker and discharged into the boom conveyor which carries the material up to its end and allows it to fall to form a stockpile. The machine travels continuously to and fro so that the pile is built up layer by layer.</p> <p>Stacker crane Similar to a bridge crane except that, instead of a hoist, it uses a mast with forks or a platform to handle unit loads Considered "fork trucks on a rail"</p>			
<p>XIV.</p>	<p>Safety principle of materials handling, demands that the "handling methods and handling equipment use must be safe". A safe materials handling means the activity is free from recognized hazards that can cause or likely to cause physical harm including death to employees or public and damage to materials. Materials should always be handled such that injuries or damages are brought to the minimum, if cannot be eliminated altogether.</p> <p>In order to achieve a safe materials handling operation, it is essential to follow a safety policy in the plant or workplace. This safety policy provides guidelines for elimination or reduction of accidents causing injuries and damage due to both manual and equipment assisted materials handling. The safety policy generally include training provisions, guidelines for manual and equipment assisted materials handling, materials storage and also provides guidelines on housekeeping, securing load on vehicles, fire-fighting, requirements for guarding, illumination, labels, signs, makings etc. The safety policy may also specify the responsibility towards safety procedures of various personnel and departments of an organisation.</p>	<p>7</p>	<p>7</p>	<p>7</p>