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THE OPEN UNIVERSITY OF SRI LANKA
Department of Civil Engineering
Postgraduate Diploma/Master of Technology in Construction Management - Level 7

CEX7111 – Construction Plant Management & Construction Safety

FINAL EXAMINATION - 2016/2017

Time Allowed: Three Hours

Date: 2017 – 12 - 02 (Saturday) Time: 0930 - 1230 hrs

Answer Four (04) questions with at least one (01) from Section B.

Section A: Construction Plant Management

Q1.

i.) The Society of Automotive Engineers (SAE) of USA, although an automotive institue has provided with a classification for construction equipment under *six (06)* **broad categories**. With short explanatory notes, describe *three (03)* of these categories.

(08 Marks)

ii.) In the classification for construction machinery and equipment by the CIB working Commission on Mechanization in Building a major category is the **'Earth Moving Machines & Equipment'**. This category has *nine (09)* sub categories representing various earth handling equipment. Name *six (06)* of these sub categories, with short explanations for each. *(08 Marks)*

iii.) **Total Work Time** for a construction equipment is subdivided into several components. With short descriptions of each identify these components. Utilizing thus, define and discuss the significance of **Operational Availability**, and **Mechanical Availability** with regard to equipment in construction operations.

(09 Marks)

Q2.

i.) Mainly used for ground surface profiling and shallow cutting, Motor Graders are versatile machines for construction operations. Describe *three (03)* main **physical attributes** upon which **Motor Graders** can be classified, with features available under each attribute category coupled with the utility of these features in different types of construction operations. *(08 Marks)*

ii.) Develop an equation for calculating the production rate of a articulated wheeled loader serving a truck from a stockpile using V shape loading. You should use the physical characteristics/dimensions of the machine, positioning/changing times, speed of the machine, etc., to develop this equation. *(08 Marks)*

iii.) Describe **Traction & Actuator Power Trains** of an **Articulated Wheeled Loader** of 1.0 m^3 bucket capacity (as an indication of the size of the machine) with **four wheel drive. The** prime mover for the machine is a **turbo charged & intercooled diesel engine** and **power shift transmission** is employed for traction drive. In your description pay special attention to **hydraulic power flow** for different actuators of the machine. *(09 Marks)*

Q3.

i.) Describe the reasons for a contractor to have an **'insurable interest'** in the plant and machinery assigned for a project in view of contractual as well as personal factors.

(08 Marks)

ii.) Construction machinery with a motive power plant in the form of a diesel engine, invariably adopt a mechanism known as a **'Torque converter'** to couple the engine to the traction drive. Describe the fundamental purpose served by a torque converter and its operating principle.

(08 Marks)

iii.) For the purpose of recording the effective and productive utilization of the construction equipment, an indicator known as a **'Hour Meter'** is a standard item in most of the machies. Describe the ingenious function of this very simple instrument in its ability to quantify the measure of energy expended by the machine.

(09 Marks)

Q4.

i.) Discuss the rationale supporting the depreciation of construction plant and *three (03)* possible mathematical methods to apply depreciation. With reasoning propose the most suited of these three methods to depreciate newly acquired construction plant.

(08 Marks)

ii.) Discuss the *two (02)* major **Cost Components** pertaining to a construction plant and the most common subdivisions of these two components as applicable to construction plant. Explain how hourly cost of operating for a plant could be derived based on these cost components.

(08 Marks)

iii.) In irrigation, land reclamation and material extraction works **'Dregers'** are widely used plants. Describe the *two (02)* main types of dregers based on their mode of operation and sub variants under each type, siting specific construction applications for each.

(09 Marks)

Section B Construction Safety and First Aid

Q5.

i.) Name and explain *five (05)* **accident prevention measures** that should be considered at the Planning stage of a construction project keeping in mind the conditions prevailing in Sri Lanka.

(08 Marks)

ii.) Construction site personnel meeting with accidents could sustain many types of injuries. Out of these 'wounds' inflicted on the body are most common. Describe *five (05)* major types of wounds commonly inflicted on victims of construction site accidents.

(08 Marks)

iii.) Even though several amendments and updradings had been affected, the general opinion is that the legal framework pertaining to welfare and safety of the work force is not reflecting the universally accepted standards of the times. What are the basic drawbacks in the presently enforced Safety Legislation in relation to the globally prevailing socio/economic perspective?

(09 Marks)

Q6.

i.) **Cardio Pulmonary Resuscitation** (CPR) is a first aid technique often required to be administered on accident victims at construction sites. After describing medically related conditions for which this technique could be applied, describe the steps involved in administering the CPR procedure.

(08 Marks)

ii.) Clearly describe the medical condition known as a **'stroke'** with related signs and symptoms. Enumerate the steps to be followed when administering first aid to a victim suffering from a stroke.

(08 Marks)

iii.) Define the medical condition known as **'shock'**, enumerate *five (05)* significant signs of shock that a victim might exhibit and describe the first aid measures to be administered to a victim of shock in detail.

(09 Marks)