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

CEX7111 – Construction Plant Management & Construction Safety

FINAL EXAMINATION - 2014/2015

Time Allowed: Three Hours

Date: 2015 - 09 – 09 (Wednesday) Time: 0930 - 1230 hrs

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

Section A: Construction Plant Management

Q1.

i.) The activities of **Management** can be described under four main areas. Name and describe these *four (04)* areas dealt under Management with reference to construction project execution.

(08 Marks)

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

(08 Marks)

iii.) The total time of a construction equipment deployed in the field can be subdivided to various components based on the state of the equipment. Enumerate the applicable time components, which make up the total time, for a construction equipment with short descriptions of each component. Through the above descriptions define and discuss the difference between **Operational Availability**, and **Mechanical Availability** of a construction equipment.

(09 Marks)

Q2.

i.) In most of the mobile construction machinery where the basic power plant is a diesel engine, a mechanism known as a 'Torque converter' is used to couple the engine to the traction drive. Describe the operating principle and the main parts of a torque converter.

(08 Marks)

ii.) 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.

(08 Marks)

iii.) For detailed selection of construction equipment for earth moving operations, at least *five (05)* significant considerations need to be addressed. Describe each of these considerations including their bearing on the optimal selection.

(09 Marks)

Q3.

i.) Describe the reasons for the constructor (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.) Describe *two (02)* types of insurances available for construction plant that could be obtained by a contractor engaged in constructional work.

(08 Marks)

iii.) Describe the reasons for the following stipulations by insurers when proposing policies for construction plant insurance;

a.) Need for the sum insured for a particular plant to be the present purchase value for a new plant while the liability on the part of the insurer in the event of a 'total loss' of the particular plant is limited to its depreciated value.

b.) 'Excesses' or 'deductibles' supporting non-claims.

(09 Marks)

Q4.

i.) Discuss the reasons for adopting the 'Straight line method' over 'Declining balance method', in depreciating construction equipment.

(10 Marks)

ii.) A medium sized construction company in Sri Lanka, with a substantial annual work volume in road construction, wishes to ascertain whether it is economical to purchase a Loader-backhoe combine on a bank loan than to obtain one on daily hire. On average the company annually has about 2500 hours of work for such a machine. Evaluate the average hourly **owning and operating cost** during the first (01) year of service for such a machine based on following data.

The engine is a 75 hp (Gross power) turbocharged intercooled Diesel. You may assume any other factors not provided.

Purchase price	-	Rs. 6,000,000/= (New)
Interest on capital	-	12 % per annum
Useful lifetime	-	15,000 Hours
Projected Scrap value	-	Rs. 3,000,000/=
Registration fee	-	Rs. 9,000/= per annum
Insurance premium	-	1.5 % of the value of the machine at the beginning of the year
Depreciation method	-	Straight Line

Specific fuel consumption	-	0.16 kg/HP/Hour
Specific gravity of diesel fuel	-	0.80
Average engine load factor	-	60 %
Cost of diesel fuel	-	Rs. 95/= per liter
Average lubricant/filter change interval	-	250 Hours
Total lubricant capacity	-	25 liters
Average lubricant cost	-	Rs. 450/= per liter
Number of filters to be changed	-	4 per interval
Average cost of a filter	-	Rs. 2,200/=
Annual Maintenance/Repair cost (Assumed uniform over the lifespan)	-	80 % of annual depreciation
Operator wages	-	Rs. 300/= per hour

(15 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.) 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)

ii.) After defining the medical condition known as 'shock', enumerate *five (05)* signs of shock that a victim might exhibit. Further, briefly describe first aid measures to be administered to a victim of shock.

(08 Marks)

iii.) A Worker at a construction site where you are the Resident Engineer, has suddenly fallen and is unconscious. The symptoms displayed by the casualty were reported to you as follows, by a Technical Officer.

a.) Foaming at the mouth
b.) Interfered breathing, rigidity and jerky movements of the body occurring alternatively.
c.) Later, gradual subsidence of jerky movements has been observed.

Diagnose the probable medical condition afflicting the victim and propose major first aid and other life saving steps you should follow.

(09 Marks)