CS/B.Tech(AUE)/SEM-8/AUE-813/2012

2012

OFF ROAD VEHICLES

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

10X1 = 10

i) Marching speed of shovel is

a) about 2 kmph b) about 15 kmph

c) about 25 kmph d) about 40 kmph.

ii) Control of swing and bucket hoist mechanism of electric shovel is performed by

a) Mechanical means b) Hydraulics means

c) Pneumatical method d) None of these.

iii) Dragline usually mounted on

a) wheel assembly

b) crawler assembly

c) walking mechanism

d) both (b) & (c).

iv) Boom angle with horizontal line during dragline operation may be

a) 45° b) 60°

c) 30° d) any angle.

v) Which is not the movement of dozer blade ?

a) Up & down

b) Rotation about horizontal axis

c) Rotation about vertical axis

d) Angling of blade.

vi) Deep hardened grouser is provided with dozer shoe for

a) better braking action

b) better gripping with the ground

c) to prevent overspeeding of dozer

d) none of these.

vii) Hydraulic jack fitted in dumper is used for

a) Reducing the road shock

b) Replacement of tyre

c) Lifting of dump body

d) None of these.

viii) Power steering of dumper

a) operated by engine power

b) operated by battery power

c) both (a) and (b)

d) none of these.

ix) Crowing of road surface is done by

a) Dozer blade

b) Grader blade

c) Front end loader bucket

d) Cutting edge of scraper.

x) Apron is a component of

a) Dozer b) Grader

c) Front end loader d) Scraper.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3X5 = 15

2. A dragline having specification 24/96 operates in a coal mine under the following conditions : The machine operates 3 shifts per day having 350 days per year with average utilization of 85%. Average cycle time 65 sec and bucket fill factor 65%. Calculate annual production capacity of dragline. Assume any data your require.

3. A shovel, 4.6 cu. meter bucket capacity is employed along with dumper in a project with the following conditions :

Dumpers to be filled up by 5 passes

Bucket fill factor is 75%

Bulk density of materials — 1.7 T/cu.m

Pay load of 50 T dumper is 45.360 T

Pay load of 35 T dumper is 31.752 T

Pay load of 25 T dumper is 22.68 T.

Select among the above dumpers, which one you will employ for the present case.

4. Differentiate the construction features of dozer and grader blades with neat sketches.

5. A dozer blade having dimension 3560 mm 1530 mm operates in down the gradient of 5%, what would be the output of the dozer in cu. metre.

6. Explain with neat sketch a dragline bucket.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3X15 = 45

7. A dozer having blade dimension 4315 mm 1875 mm operates on level ground. The forward speed of the dozer is 8 kmph and reverse speed of the dozer is 12 kmph.

Forward & reverse gear changing takes 0.15 minutes each. The material is to be cut for 50 m length and to be discharge just after 50m. While width of the portion to be cut is 8.5 m. Assume depth of cut to be 10 cm. Calculate the time require to complete the job and cutting capacity per hour of the dozer. Explain your cutting plan with the help of neat sketch.

8. A diesel shovel bucket capacity of 1.9 cu. metre having the following particulars :

Average life of shovel — 7 years

Fuel consumption — 30.00 lit/hr

Lubrication cost — 25% of fuel cost

Repair cost — 80% of depreciation cost

Cycle time — 22 sec

Bucket fill factor — 0.75

Purchase price — Rs. 1.0 crore

Wage of operators etc. — Rs. 50000 per month

Utilization factor — 80%

Cost of fuel — Rs. 40.00 per litre

Insurance cost — Rs. 1.0 lac per year

Road tax — Rs. 1.5 lac per year

Bank interest — 15%

Shovel operates 2 shifts per day having 350 days per year.

Calculate the cost of material excavated per cu. metre. Assume any data you require.

9. a) Explain with neat sketch the deck layout of Electric shovel.

b) Swing and propel mechanism receive power from the

same shaft in Diesel shovel. Explain.

10. Discuss with neat sketch the hydraulic circuit used in Dumper for operation of steering system and hoisting of dump body. What is emergency steering system ? Explain how it functions in dumper and its need.

11. Draw the power flow diagram of road grader driving wheel and discuss its function.