Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(AUE)/SEM-8/AUE-813/2010

2010

OFF ROAD VEHICLE

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 : 10 × 1 = 10

i) Swell factor value is usually

a) zero b) one

c) less than one d) more than one.

ii) Ward-Leonard system is used

a) in shovel only b) in dragline only

c) in dozer only d) both (a) & (b).

iii) Swing motor in electric shovel is

a) A.C. motor b) D.C. motor

c) both (a) & (b) d) none of these.

iv) In dragline, drag cable passes over

a) boom sheave pulley b) fair lead

c) both (a) and (b) d) none of these.

v) When the dozer blade is in floating condition
   a) blade becomes fixed at particular position
   b) blade follows the contour of the ground
   c) blade tries to rotate
   d) none of these.

vi) Retarder is used in
   a) Dragline b) Dozer
   c) Dumper d) Shovel.

vii) Hydraulic circuit of dozer uses
   a) Centrifugal pump
   b) Gear pump
   c) Reciprocating pump
   d) Jet pump.

viii) Emergency steering pump of dumper uses
   a) power from engine crankshaft
   b) power from dynamo of dumper
   c) power from battery
   d) power from driver's manual effort.

ix) Dog clutch in shovel helps in
   a) swinging of the superstructure
   b) hoisting of the bucket
   c) steering of the shovel
   d) smooth crowding of shovel.

x) Marching of dragline is done in
   a) forward direction only
   b) backward direction only
   c) sidewise direction only
   d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain with neat sketch the crowd mechanism of electric shovel.
3. Discuss with neat sketch the walking mechanism of Drag- line.
4. With neat sketch discuss the power transmission system of dozer.
5. Draw and explain the hydraulic control circuit of Dumper used for lifting the dump body.
6. A shovel discharges material on a dumper of 35 ton capacity. How much time is required to fill the dumper, if the shovel is having following parameters ?

   Bucket capacity — 4.6 cu.m, Cycle time — 38 sec,

   Bucket fill factor — 0·75, Utilisation factor — 0·8

   Bulk density of the material — 1·5 ton / cu.m.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. A dozer blade having dimension 4315 mm × 1875 mm operates on level ground. The speed of the dozer in forward direction is 10 kmph and the speed of dozer in reverse direction is 15 kmph. If the materials are to be shifted over 50 m, calculate the output of dozer. Clearly state your assumptions needed for the solution.
8. a) With neat sketch describe the suspension system used in Dumper.

   b) Draw the diagram of deep V-shaped dump body of dumper. Discuss the reasons of providing such shape and design. 8 + 7

9. A dragline with 15 cu.m bucket capacity and 90 m boom length is employed for the removal of overburden from an open cast project. The average depth of overburden is 20 m. Determine the expected time to shift the dragline to another place when

   Bucket fill factor is 65%

   Utilization factor is 80%

   Cycle time is 65 sec.

   Average surface area is 200 sq.m

   Assume any suitable data.

10. The following particulars refer to an electric shovel :

Bucket capacity	—	4·6 cu.m
Average life	—	10 yrs.
Power	—	500 kVA
Lubrication cost	—	12% of power cost
Repair cost	—	60% of depreciation cost
Cycle time	—	34 sec
Bucket fill factor	—	75%
Purchase price	—	Rs. 2·00 crore
Operator's salary etc.	—	Rs. 20,000 per month
Insurance cost	—	Rs. 4 lakh per year
Interest	—	15%
Power cost	—	Rs. 5/kWh

   Calculate the extraction cost per cu.m of material excavated.

   Assume any other data.

11. a) Draw the kinematics diagram of grader power transmission system. Explain its function.

    b) Draw the diagram of grader and label the different components on it. 8 + 7