

# GBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

15MN44

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Mine Mechanization - I

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Define a compressed air. List some of the things that works with the help of compressed air. (08 Marks)
- b. State the ideal gas law. A mine machinery powered by 350 KW engine is running at a speed of 35km/h. Considering the mechanical transmission efficiency of the machinery as 85%, find out the Rim pull of the machinery in kN. (08 Marks)

OR

- 2 a. Explain how a Jackhammer works with compressed air. (05 Marks)
- b. What is a mine haulage system? Name the classification system. (06 Marks)
- c. A drive shaft of an engine develops torque of 500 n-m, find the power transmitted the shaft in KW if it rotates at a constant speed of 50 rpm. (05 Marks)

### Module-2

- 3 a. A direct rope haulage pulls 8 tubs loaded with coal through an incline of length 500m having an inclination of 1 in 6. Consider the following additional data and also refer Fig.Q3(a). capacity of tub = 1.0 tonne, tare weight of tub = 500 kg hauling speed = 9km/hr, coefficient of friction between wheel and rail =  $\frac{1}{6}$ , coefficient of friction between rope and drum =  $\frac{1}{10}$ , mass of rope per meter = 1.5kg. What will be the minimum power required to haul the tubs in KW. (08 Marks)

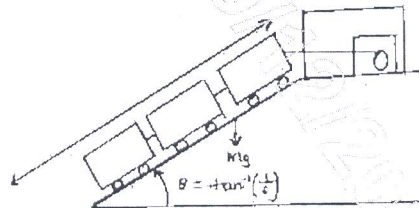


Fig.Q3(a)

- b. Write a short note on types and construction of wire ropes. Draw a neat sketch of a cross – section of round strand ropes. (08 Marks)

OR

- 4 a. What are the various factors affecting the selection of wire ropes. (10 Marks)
- b. A steel wire ropes of 25mm diameter weighing 37 N/m has 6 strands and 7 wires each. The diameter and tensile strength of each wire are 2.5mm and 1800MPa, respectively. The factor of safety for raising a cage of weight 60kN from a depth of 200m would be what? (06 Marks)

### Module-3

- 5 a. What are the different types of conveyors used in mining explain them in detail? (08 Marks)
- b. What will be the width of the belt in mm of a flat belt conveyor carrying coal of bulk density 1 tonne/m<sup>3</sup> at a rate of 400 tonne/h. The belt speed is 3m/s coal is spread over the belt covering 80% of the belt width in a shape of a triangle, and the pile height is  $\frac{1}{4}$  of the belt width. (06 Marks)
- c. What are the different types of Locomotives used in mining? Which type of Locomotive is much preferred in underground coal mine? (02 Marks)

OR

- 6 a. What is the maximum tractive effort that can be developed by an 15 tonne diesel Locomotive of 75KW assuming a coefficient of adhesion 0.25? At what speed will it haul a train when developing its full power and maximum tractive effort, assuming the mechanical efficiency to be 83%. (08 Marks)
- b. A loco of mass 10000 kg has a coefficient of adhesion to the tracks as 0.25, it offers a rolling resistance equal to 10% of its weight find : i) draw bar pull generated by the loco on level ground ii) draw bar pull in a upward gradient of 5°. (08 Marks)

Module-4

- 7 a. A mine winder gage travelling 450m from put bottom to pit top is following a three period of duty cycle as shown in Fig Q7(a). Find the maximum velocity attained by the gage in m/s. (04 Marks)

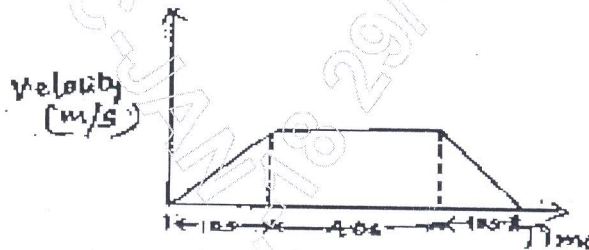


Fig.Q7(a)

- b. Define friction winding. Discuss there two type and enlist there advantages over drum winding systems. (08 Marks)
- c. In which type of winding safety hook is not required? Draw a neat sketch of bi-cylindro – conical drum; start of wind and bi-cylindro – conical drum end of wind. (04 Marks)

OR

- 8 a. A balanced winder raises 3000 tonnes per day from a depth of 500m. The payload of the winding cage is 7 tonnes. The energy consumed per day in KWh is 70% then what will be the winder efficiency. (04 Marks)
- b. What are the adjustments you will carryout for variation in rope tension explain with a neat sketch. (12 Marks)

Module-5

- 9 a. List some of the safety devices on winders. (08 Marks)
- b. Draw a neat sketch of a suspended caliper brake and just explain the function of the parts. (08 Marks)

OR

- 10 a. With a neat sketch explain the pit – top layout with run round arrangement. (08 Marks)
- b. What steps would do you stake if the train due to the centrifugal action creates a tendency to leave the track and proceed along a tangential curve? (04 Marks)
- c. What is the use of Jim crow? Why it is necessary to widen gauge on curves? (04 Marks)

\*\*\*\*\*