



# STUDY MATERIAL (MCQ PACK) FOR DGMS, PSU, GATE MINING EXAMS

- ✓ 100% exam oriented
- ✓ Latest questions included
- ✓ Frequent updates
- ✓ Low fee

## MORE INFO

+91-9412903929

[AMIESTUDYCIRCLE.COM](http://AMIESTUDYCIRCLE.COM)

[AMIESTUDYCIRCLE@GMAIL.COM](mailto:AMIESTUDYCIRCLE@GMAIL.COM)

CIVIL LINES, NEAR IIT, ROORKEE



- (a) tonnes per hour\*
- (b) tonnes per minute
- (c) kg per hour
- (d) kg per minute
- (e) none

(DFGMS FCMC/METAL/R/DEC-2021)

1826. The stability of a dam is checked for

- (a) tension at the base
- (b) overturning of the wall or dam
- (c) siding of the wall or dam
- (d) all of these\*
- (e) none

(DFGMS FCMC/METAL/R/DEC-2021)

1827. A taper provided on the pattern for its easy and clean withdraw! from the mould is known as

- (a) machining allowance
- (b) draft allowance\*
- (c) shrinkage allowance
- (d) distortion allowance
- (e) none

1828. The point, through which the whole weight of the body acts, irrespective of its position, is known as

- (a) moment of inertia
- (b) centre of gravity\*
- (c) centre of percussion
- (d) centre of mass
- (e) none of these

(DFGMS FCMC/METAL/R/DEC-2021)

1829. A weight of 1000 N can be lifted by an effort of 80 N. If the velocity ratio is 20, the machine is

- (a) reversible machine\*
- (b) non- reversible machine
- (c) ideal machine
- (d) no machine
- (e) None

(DFGMS FCMC/METAL/R/DEC-2021)

1830. The relation between number of links (L) and number of joints (j) in a kinematic chain is

- (a)  $L = 1/2 \times (j + 2)$
- (b)  $L = 2/3 \times (j + 2) *$
- (c)  $L = 3/4 \times (j + 3)$
- (d)  $L = j + 4$
- (e) None

(DFGMS FCMC/METAL/R/DEC-2021)

1831. The mechanism forms a structure, when the number of degrees of freedom (n) is equal to

- (a) 0\*
- (b) 1
- (c) 2
- (d) -1
- (e) none

(DFGMS FCMC/METAL/R/DEC-2021)

1832. The rate of change of displacement of a body is called

- (a) velocity\*
- (b) acceleration
- (c) momentum
- (d) force
- (e) none

(DFGMS FCMC/METAL/R/DEC-2021)

1833. A machine having an efficiency less than 50 %, is known as

- (a) reversible machine
- (b) non- reversible machine\*
- (c) neither reversible nor non reversible
- (d) ideal machine
- (e) None

(DFGMS FCMC/METAL/R/DEC-2021)

1834. Which of the following devices may be used for extending the range of instruments

- (a) Shunts
- (b) Multipliers
- (c) Current transformers
- (d) Potential transformers
- (e) all of these\*

(DFGMS FCMC/METAL/R/DEC-2021)

## QUESTIONS FROM PSU EXAMS

1835. Which equipment is not used for stripping work in open cast mine.

- (a) Shovel
- (b) Dragline
- (c) Bucket wheel excavator
- (d) SDL\* (NCL Jr Overman 2017)

1836. AVA is used in

- (a) Belt conveyor
- (b) Vehicles used in mines\*
- (c) Crusher

(d) Rest shelter (NCL Jr Overman 2017)

1837. Dozer used as

- (a) Loading equipment
- (b) Transport equipment
- (c) Leveling & pushing purpose\*
- (d) for crushing & screening purpose (NCL Jr Overman 2017)

1838. It is not related with dragline

- (a) Drag
- (b) Hoist
- (c) Swing
- (d) Crowd\* (NCL Jr Overman 2017)

1839. Safety features in a Dumper is

- (a) Rear View Mirror
- (b) Proximity sensor
- (c) AVA
- (d) All of the above\* (NCL Jr Overman 2017)

1840. For overburden removal with shovel dumper combination the optimum size of the dumper depends on

- (a) The distance of the haul
- (b) Size of the shovel
- (c) Size of the shovel and the distance of haul\*
- (d) Tonnage to be handled (BCCL Jr Overman 2017)

1841. Which of the following statements is/ are true?

- I. Parking brake is to be used when the dumper is in motion.
- II. Parking brake is to be tested with dumper is in full load
- III. Parking brake is to be tested with dumper is in empty position
- IV. Parking brake is to be tested at maximum gradient, permitted for at least 10 minutes.
- (a) IV only
- (b) II only
- (c) II, IV\*
- (d) III only (BCCL Jr Overman 2017)

1842. Side Discharge Loader (SDL) is a

- (a) Crawler mounted machine\*
- (b) Tyre mounted machine
- (c) Rail mounted machine
- (d) Both (a) & (b) (BCCL Jr Overman 2017)

1843. The main purpose of Jazz rail in underground haulage track is

- (a) To avoid over speeding\*
- (b) To maintain good alignment of track
- (c) To avoid derailment of tubs
- (d) To provide smooth running of tubs (BCCL Jr Overman 2017)

1844. According to DGMS circular the maximum speed of the dumper shall be restricted to:

- (a) 30 kmph\*
- (b) 20 kmph
- (c) 25 kmph
- (d) 40 kmph (NCL MS 2022)

1845. Match the columns.

#### **Equipment**

- P. Dragline
- Q. Bucket wheel excavator
- R. Tunnel boring machine
- S. Hydraulic monitor

#### **Action/Purpose**

- 1. Reaming
- 2. Key cut
- 3. Pulsating impact
- 4. Terracing
- (a) P-2, Q-4, R-1, S-3\*
- (b) P-1, Q-2, R-3, S-4
- (c) P-2, Q-4, R-3, S-1
- (d) P-3, Q-4, R-2, S-1 (NCL MS 2022)

1846. Stripping ratio of mechanized open cast working in India with dragline working is:

- (a) 1 in 16\*
- (b) 1 in 5
- (c) 1 in 10
- (d) 1 in 7 (NCL MS 2022)

## **QUESTIONS FROM GATE EXAMS**

1847. The approximate head generated by a single-stage centrifugal pump of 250 mm diameter impeller running at 1440 rev/min with manometric efficiency of 0.7 is

- (a) 25 m\*
- (b) 36 m
- (c) 72 m
- (d) 144 m (GATE, 1998)

626. The approximate head generated by a single-stage centrifugal pump of 250 mm diameter impeller running at 1440 rev/min with manometric efficiency of 0.7 is

- (a) 25 m\*
- (b) 36 m
- (c) 72 m
- (d) 144 m (GATE, 1998)

Solution:

$$v = \pi DN/60$$

$$= 3.14 \times 0.25 \times 1440/60$$

$$= 18.84 \text{ m/s}$$

$$H = v^2/2g = 18.84^2/2 \times 9.8$$

$$= 18.11 \text{ m}$$

Now Manometric head (the head to which pump has to work)

$$= H/\eta = 18.11/0.7 = 25.87 \text{ m}$$

1848. Koepe system of winding does not include

- (a) Tapper guide
- (b) Limit switches
- (c) Safety hook\*
- (d) Brake (GATE 2009)

1849. Two belt conveyors load a ground bunker, each at a rate of 400 tph which is initially filled with 10000 t of coal. Coal is discharged from the bottom of the ground bunker onto a belt conveyor at a rate of 1200 tph. The time elapsed in hours before the bottom conveyor starts to operate below its rated capacity is

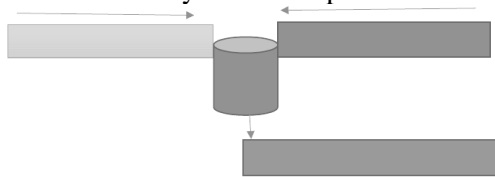
- (a) 6.5
- (b) 8.5
- (c) 12.5
- (d) 25.0\* (GATE 2009)

Solution: No. of belt conveyors = 2

Loading rate = 400 tph

Initially quantity in bunker = 10000 t coal

Rate of Coal discharged from ground bunker onto belt conveyor = 1200 tph.



Capacity of 1st and 2nd belt conveyor (q) = 400 tph

Capacity of 3rd belt conveyor (Q) = 1200 tph

Initial mass of coal in the bunker (M) = 10000 tonne

Doing mass balance

$$M + q \times T + q \times T = Q \times T$$

$$10000 + 2 \times 400 \times T = 1200 \times T$$

$$\therefore T = 25 \text{ hr.}$$

1850. A 1100 V, 3 $\phi$  power supply system of a mine draws a load of 185 kW. The ammeter reading shows 115 A. The power factor of the system is

- (a) 0.84\*
- (b) 0.73
- (c) 0.64
- (d) 0.4S (GATE 2009)

Solution:  $P = \sqrt{3} VI \cos \phi$

$$\therefore 185 \times 1000 = \sqrt{3} \times 1100 \times 115 \cos \phi$$

$$\therefore \cos \phi = 0.86$$

1851. A turbine pump of efficiency 70% discharges water at the rate of 2100 L/min at a total head of 100 m. If the pump is run by a motor of efficiency 90 %, the input power required for the motor in kW is

- (a) 22.49
- (b) 34.31
- (c) 44.11
- (d) 54.50\* (GATE 2009)

1852. A turbine pump of efficiency 70% discharges water at the rate of 2100 L/min at a total head of 100 m. If the velocity of water in suction and delivery pipes of the pump are 1.8 m/s and 2.5 m/s respectively, the diameter delivery pipes in cm are of suction and

- (a) 15.73 and 13.35\*
- (b) 7.86 and 6.67
- (c) 5.78 and 6.02
- (d) 4.97 and 4.22 (GATE 2009)

1853. The tool used for borehole deviation is

- (a) String shot
- (b) Kelly
- (c) Whip stock\*
- (d) Ratchet (GATE 2008)

1854. During over-winding, a cage is safely suspended in the headgear due to

- (a) Bull chain
- (b) Rope capel
- (c) D-Link .
- (d) Detaching hook\* (GATE 2008)



1855. In the order of the chronological development, the longwall support systems are arranged as

P Powered support

Q Link bar and friction support

R Frame support

S Hydraulic support

(a)  $P > Q > R > S$

(b)  $R > S > Q > P^*$

(c)  $S > R > P > Q$

(d)  $Q > S > R > P$  (GATE 2008J)

1856. A drum winder of radius 2.5 m draws a power of 308 kW. When the maximum rope speed is 7 m/s. the RMS torque in kNm is

(a) 55

(b) 76

(c) 110\*

(d) 144 (GATE 2008)

Solution: Power = FV

$$308,000 = F \times 7$$

$$\therefore F = 44000 \text{ N}$$

$$\text{Torque} = F \times R$$

$$= 44000 \times 2.5$$

$$= 110,000 \text{ Nm} = 110 \text{ kNm}$$

1857. A belt conveyor conveys material of average cross-sectional area of  $0.09 \text{ m}^2$  of bulk density  $1.5 \text{ tonnes/m}^3$  at a speed 2 m/s. The carrying capacity of the belt in tonne/hr is

(a) 972\*

(b) 864

(c) 732

(d) 643 (GATE 2008)

Solution:  $T = abV$

$$= 0.09 \times 1.5 \times 2 = 0.27 \text{ t/s}$$

$$= 0.27 \times 3600 = 972 \text{ t/hr}$$

1858. A conveyor of rated power 100 kW hauls coal up-dip at 30 kg/s along an inclination of  $15^\circ$  and distance 300 m. Heat added by the conveyor to the air in kW is

(a) 56.4

(b) 65.9

(c) 77.2\*

(d) 82.3 (GATE 2008)

1859. A cage of floor area  $5 \text{ m}^2$  suspended in a shaft has a drag coefficient 2.5. If the velocity of air in the shaft is 6 m/s, the drag force (N) experienced by the cage is

(a) 120

(b) 170

(c) 200

(d) 270\* (GATE 2008)

$$\text{Solution: } F_D = C_d \rho V^2 A / 2$$

$$= 2.5 \times 1.2 \times 6^2 \times 5 / 2$$

$$= 270 \text{ N}$$

1860. In a coal handling plant wagons of 8 m length are loaded, at rake travel speed of 0.48 km/hr. The chute loading rate is 6000 tonne/hr. As the rake moves continuously, the chute stops for a total of 24s in between two wagons. The quantity of coal in tonne loaded in each wagon is

(a) 52

(b) 60\*

(c) 76

(d) 94 (GATE 2008)

1861. A loco of mass 10000 kg has a coefficient of adhesion to the tracks as 0.25. The loco offers a running resistance equal to 10 % of its weight. The draw-bar-pull generated by the loco on a level ground in kN is

(a) 11.3

(b) 14.7\*

(c) 15.5

(d) 17.2 (GATE 2008)

1862. In the above questions, the draw-bar-pull generated by the loco when the upward gradient of the track is  $5^\circ$  in kN is

(a) 6.16\*

(b) 7.9

(c) 9.5

(d) 11.5 (GATE 2008)

1863. A dragline is required to remove 3,00,000  $\text{m}^3$  of rock per month on the bank volume basis. Consider the following data for the dragline operation.

Effective working hours per month = 450

Bucket fill factor = 0.8

Cycle time = 65 s

Swell factor of the rock = 1.25

The minimum bucket capacity of the dragline in  $\text{m}^3$  is

(a) 7.70

(b) 9.63

(c) 12.04

(d) 18.80\* (GATE 2014)

1864. A direct rope haulage pulls 8 tubs loaded with coal through an incline of length 500 m having an inclination of 1 in 6. Consider the following additional data.

Capacity of tub = 1.0 tonne

Tare weight of tub = 500 kg

Hauling speed = 9 km per hour

Coefficient of friction between wheel and rail =  $\frac{1}{60}$

Coefficient of friction between rope and drum =  $\frac{1}{10}$

Mass of rope per meter = 1.5 kg

The minimum power required to haul the tubs in kW is

- (a) 345.50
- (b) 348.60
- (c) 350.10
- (d) 365.50 (GATE 2014)

Solution: Mass of rope =  $1.5 \times 500 = 750$  m

Mass of one tub =  $1000 + 500 = 1500$  kg.

Mass of 8 tubs =  $8 \times 1500 = 12000$  kg.

Gravity component of tub =  $12000 \times 9.8 \times (\frac{1}{6}) = 19600$  N

Gravity component of rope =  $750 \times 9.8 \times (\frac{1}{6}) = 1225$  N

Force required to overcome friction of tub =  $(\frac{1}{60}) \times 19600 = 326.7$  N

Force required to overcome friction of rope =  $(\frac{1}{10}) \times 1225 = 122.5$  N

Total force =  $21274.2$  N =  $21.3$  kW

Velocity =  $9$  km/hr =  $2.5$  m/s

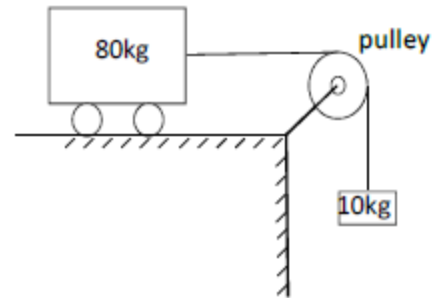
Power =  $FV = 21.3 \times 2.5 = 53.25$  kW

Hence, we see that given options are **not correct**.

1865. In a belt conveyor system, function of the snub pulley is to

- (a) clean the inner surface of the belt
- (b) clean the outer surface of the belt
- (c) increase the angle of contact of belt with drive drum\*
- (d) decrease the belt tension (GATE 2013)

1866. In the following figure, the coefficient of kinetic friction between the trolley and the surface is  $0.04$ . When the block is released from rest, the acceleration of the trolley in  $\text{m/s}^2$  becomes



- (a) 9.65
- (b) 1.23
- (c) 1.09
- (d)  $0.74^*$  (GATE 2013)

1867. Two meshing spur gear wheels of Module 6 have 24 and 42 teeth. The distance in mm between the centres of the gear wheels is

- (a) 1000
- (b)  $198^*$
- (c) 126
- (d) 72 (GATE 2013)

1868. A bucket wheel excavator with 20 buckets of capacity  $0.5 \text{ m}^3$  each, rotates at  $5 \text{ rev/min}$ . The bucket fill factor is  $80\%$ . The excavator loads on to  $1200$  mm wide belt conveyor. The cross-section area ( $\text{m}^2$ ) of the material on the belt is  $0.1B^2$ , where  $B$  is the belt width in m. The minimum speed of the belt in  $\text{m/s}$  to avoid spillage of material is

- (a) 7.23
- (b) 5.79
- (c)  $4.63^*$
- (d) 3.70 (GATE 2013)

1869. When a double ended ranging drum shearer cuts coal in a longwall face,

- (a) both the drums rotate in the same direction keeping the front drum up and the rear drum down
- (b) both the drums rotate in the opposite direction keeping the front drum up and the rear drum down\*
- (c) both the drums rotate in the opposite direction keeping the front drum down and the rear drum up

(d) both the drums rotate in the same direction keeping the front drum down and the rear drum up (GATE 2012)

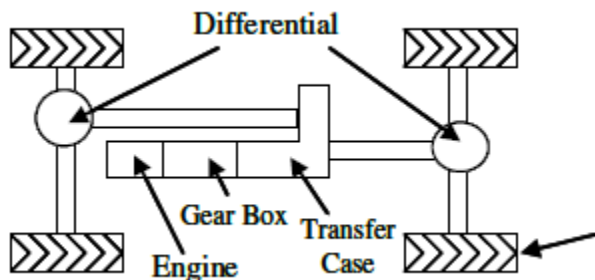
1870. Continuous miner and shuttle car combination is NOT applicable in mining with

- (a) rib pillar extraction technique
- (b) Wangawilli system
- (c) room and pillar method
- (d) longwall method\* (GATE 2012)

1871. A shearer is deployed in a mine where the specific energy consumption for cutting coal is  $800 \text{ kJ/m}^3$ . The specific gravity of coal is 1.2. If the machine produces 700 te/h, the electrical power consumption in kW of the shearer at 65% motor efficiency is

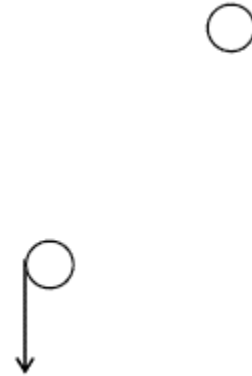
- (a) 149.4
- (b) 199.4\*
- (c) 219.4
- (d) 239.4 (GATE 2012)

1872. The gear ratios of the first gear, transfer case and differential of a four wheel drive vehicle are 3.81:1, 2.72:1 and 4.11:1 respectively. If the engine is rotating at 1000 rpm and the wheel diameter is 1.2 m, the speed of the vehicle in first gear in km/h is



- (a) 5.31\*
- (b) 3.68
- (c) 2.42
- (d) 1.68 (GATE 2012)

1873. Figure shows a two pulley system for hoisting a load of 10 kN. The coefficient of friction between each pulley and the rope is 0.2. The vertical and horizontal distances between the centers of the pulleys are 25 m and 16 m respectively.



The tensions  $T_1$  and  $T_2$  respectively in kN are

- (a) 6.00, 5.38
- (b) 12.37, 11.06
- (c) 18.74, 16.73\*
- (d) 25.11, 22.41 (GATE 2012)

1874. The following data are provided for a surface mine to be excavated by a shovel:

Production target : 10000 te/shift

Available hours per shift : 6 hrs

Shovel loading cycles per hour : 106

Bank density of the material mined :  $2400 \text{ kg/m}^3$

Swing factor at 1200 swing : 0.91

Bucket fill factor : 0.64

Utilization of available time : 83%

No of working days in a year : 300

No of shifts per day : 3

The annual production target in Mte is

- (a) 5.76
- (b) 7.00
- (c) 8.19
- (d) 9.00\* (GATE 2012)

1875. The sequence of attachments between the winding rope and the cage is

- (a) bull chains, triangular plate, capel, detaching hook
- (b) detaching hook, bull chains, triangular plate, capel
- (c) triangular plate, bull chains, capel, detaching hook
- (d) capel, detaching hook, bull chains, triangular plate\* (GATE, 2000)

1876. A coal seam of 3.0 m height is mined with a double-ended ranging drum shearer (DERDS) for a web depth of 0.5 m. The coal density is  $1.4 \text{ tonne/m}^3$ . If the panel width is 150 m, the production per cycle in tonne is —.

(GATE 2023)

Answer: 315

1877. Data related to a surface miner operation are given below

Drum width (m) = 3.0

Average cutting depth (cm) = 20

Average cutting speed (m/min) = 25

Length of pit (m) = 500

Turning time (min) = 2

Truck exchange time (s) = 30

Truck capacity ( $\text{m}^3$ ) = 15

Considering in situ volume, the production rate of the surface miner in  $\text{m}^3/\text{hr}$ , is \_\_\_\_.

(GATE 2023)

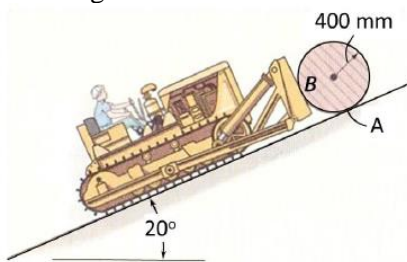
Answer: 555 to 578

1878. A continuous miner served by two shuttle cars produces 240 tonne/hr. The capacity of each shuttle car is 10 tonne. When a single shuttle car operates, the cycle time becomes 4 min. In case one of the shuttle cars is under break-down, the reduction in hourly production from that of two cars in percent is \_\_\_\_.

(GATE 2023)

Answer: 37 to 38

1879. A dozer pushes up a 100 kg spool of cable along a  $20^\circ$  incline road at a constant velocity as shown in the figure.



The coefficient of static friction between the dozer bucket and the spool (Point B) is 0.45, and coefficient of kinetic friction between road and the spool (Point A) is 0.15. Consider the spool only slides up the incline. The maximum normal force in N acting at Point B, is \_\_\_\_.

(GATE 2023)

Answer: 495 to 510

1880. An unmanned aerial vehicle (UAV) with payload of 2 kg reaches vertically 100 m in 10 s at uniform velocity. The self-weight of the UAV

is 1.2 kg. The power required in lifting in kW is \_\_\_\_.

(GATE 2023)

Answer: 0.30 to 0.32

1881. A shovel of bucket capacity  $4.2 \text{ m}^3$  makes 900 passes per day with a fill factor of 0.8. If the swell factor of the rock is 1.4 then in-situ volume handled by the shovel in a month of 24 working days in  $\text{m}^3$  is \_\_\_\_

(GATE 2020)

Answer: 51830 to 51850

1882. In a mine bench the shovel loading time follows exponential distribution with a mean loading time of 5 min per dumper. The arrival rate of dumpers that are identical in capacity, follows Poisson distribution with a mean arrival rate of 8 per hour. The probability that the shovel remains idle is \_\_\_\_

(GATE 2020)

Answer: 0.32 to 0.34

1883. A belt-drive used for power transmission between two parallel shafts has a belt of mass  $1.2 \text{ kg/m}$ , and the maximum allowable belt tension is  $2250 \text{ N}$ . If the centrifugal tension is one third of the maximum allowable belt tension the speed at which maximum power is transmitted by the belt, in m/s, is

(a) 46.48

(b) 38.73

(c) 25.00\*

(d) 35.36 (GATE 2020)

1884. A conveyor belt consumes 60 kW power while running at a speed of  $3.0 \text{ m/s}$ . The angle of lap is  $180^\circ$  and the coefficient of friction between belt and pulley is 0.2. The maximum tension (kN) in the belt is

(a) 21.7

(b) 61.7

(c) 82.9

(d) 42.9\* (GATE 2020)

1885. Tricone roller bit is used with

(a) down-the-hole hammer.

(b) Jack hammer\*

(c) rotary-percussive drill.

(d) rotary drill. (GATE 2021)



1886. The equipment used for both drop cut and terrace cut in surface mining is

- (a) surface miner.
- (b) shovel.
- (c) dragline.
- (d) bucket wheel excavator\* (GATE 2021)

1887. Surface miner does NOT have a

- (a) differential gear for turning.
- (b) tensioning arrangement for crawler.
- (c) scraper plate behind the drum.
- (d) pick cooling system\* (GATE 2021)

1888. Owning cost of a machine does NOT include

- (a) purchase price.
- (b) insurance.
- (c) interest.
- (d) operating cost\* (GATE 2021)

1889. In a bord and pillar panel six shuttle cars, each of 10 tonne capacity, are deployed to transport coal produced by two continuous miners to a belt conveyor. Each shuttle car on an average carries 80% of its rated capacity and makes 7 round trips in an hour. The belt conveyor has a capacity such that the effective material cross section area is of  $0.09 \text{ m}^2$  and runs at a speed  $1.1 \text{ m/s}$ . The broken coal has a bulk density of  $1.2 \text{ tonne/m}^3$ . The ratio between the production and the capacity of the belt conveyor, in percent is

- (a) 65.46
- (b) 71.42
- (c) 78.56\*
- (d) 82.46 (GATE 2021)

1890. A dump truck moves up an incline of  $50^\circ$  with constant tractive force of  $800 \text{ kN}$ . The gross mass of the truck is  $250 \text{ tonne}$  and its rolling resistance is  $545 \text{ kN}$ . The acceleration due to gravity is  $10 \text{ m/s}^2$ . The time required, in s, to reach a speed of  $3.3 \text{ m/s}$  from  $1.0 \text{ m/s}$  is

- (a) 22.0
- (b) 15.5\*
- (c) 3.3
- (d) 0.2 (GATE 2021)

1891. Ore is hoisted from  $620 \text{ m}$  depth using a single skip of  $7 \text{ tonne}$  pay load. The skip winding system has constant

acceleration/deceleration of  $1 \text{ m/s}^2$  and a constant speed of  $10 \text{ m/s}$ . The skip loading time and unloading time are  $120 \text{ s}$  and  $60 \text{ s}$ , respectively. Considering the overall utilization of the skip as  $70\%$ , the maximum daily capacity of the winding system, in tonne, is \_\_\_\_\_. (GATE 2021)

Answer: 1250 to 1350

1892. A single-acting reciprocating ram pump, while running at  $120 \text{ rpm}$ , delivers water at a rate of  $10 \text{ litres per second}$ . Considering the ram diameter is  $150 \text{ mm}$  and stroke length is  $300 \text{ mm}$ , the volumetric efficiency of the pump, in percent is \_\_\_\_\_. (GATE 2021)

Answer: 92.0 to 96.0

1893. Match the machine with its component

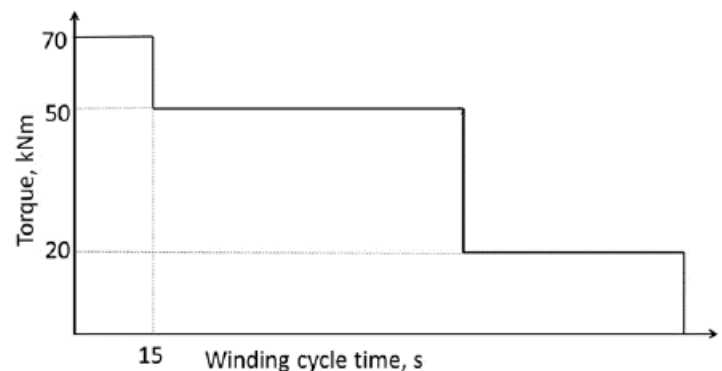
**Machine**

- P; Continuous miner
- Q; Jack hammer
- R; AFC
- S; Shield support

**Component**

- I; Flight bar
- n; Lemniscate link
- in; Loading apron
- IV; Rifle bar
- (a) P-III, Q-IV, R-I, S-II\*
- (b) P-IV, Q-III, R-I, S-II
- (c) P-III, Q-IV, R-II, S-I
- (d) P-IV, Q-III, R-II, S-I (GATE 2022)

1894. In a friction winder, the skip accelerates to a steady speed over a time span of  $15 \text{ s}$  from the start. The torque vs. time diagram for the winding cycle is shown in the figure. The deceleration time in seconds is \_\_\_\_\_. (GATE 2022)



Answer: 10.0

1895. In a small metal mine a battery powered locomotive hauls a train of mine tubs such that:  
The weight of the train of mine tubs, tonne : 3.0  
The coefficient of friction between the wheels and the rails : 0.06

The coefficient of adhesion between the loco wheels and the rails : 0.2

Time required from the start to reach speed of 1.8 m/s through constant acceleration, min : 3.0

Upward gradient to be negotiated : 1 in 20

The minimum weight of the locomotive in tonnes to meet these design requirements, is ——. (GATE 2022)

Answer: 3.7 to 3.8

1896. In a surface mine bench, overburden is removed by the shovel-dumper combination. For the dumper:

Time required at the loading station : 3.0 min

Time required at the unloading station : 1.0 min

Distance between loading and unloading stations: 4.5 km

Average speed during loaded travel : 12.0 km/hr

Average speed during empty travel : 18.0 km/hr

Minimum number of dumpers required to avoid idle time of the shovel, is ——. (GATE 2022)

Answer: 14

1897. The correct sequence of attachments between the winding rope and the cage in a drum winding system is

(a) Triangular plate → Rope capel → Bull chain → Detaching hook → Cage chain

(b) Rope capel → Bull chain → Triangular plate → Detaching hook → Cage chain

(c) Detaching hook → Rope capel → Bull chain → Cage chain → Triangular plate

(d) Rope capel → Detaching hook → Bull chain → Triangular plate → Cage chain\* (GATE 2019)

1898. The functions of automatic contrivances in a winding system are to prevent

(a) over-speeding and over-winding\*

(b) slow banking and load balancing

(c) over loading and load balancing

(d) over-speeding and load balancing (GATE 2019)

1899. If the time to failure of a machine component is exponentially distributed, the reliability of the same at Mean Time To Failure (MTTF), (rounded off to three decimal places), is ——. (GATE 2019)

Answer: 0.350 to 0.375

1900. Match the following based on the equipment usage in a comminution circuit:

#### **Equipment**

P. Gyratory crusher

Q. Cone crusher

R. Ball mill

S. Grizzly

#### **Usage**

1. Secondary' crushing

2. Grinding

3. Sizing

4. Primary crushing

(a) P-1, Q-4, R-2, S-3

(b) P-1, Q-2, R-3, S-4

(c) P-4, Q-1, R-2, S-3\*

(d) P-3, Q-1, R-4, S-2

1901. Match the following for coal mining operation:

#### **Mining Method**

P. Longwall

Q. Mechanized bord and pillar

R. Semi-mechanized bord and pillar

S. Blasting gallery

#### **Mode of Extraction**

A. Cutting by continuous miner

B. Drilling and blasting

C. Cutting by shearer

D. Long hole drilling and blasting

#### **Loading. Conveying Equipment**

1. AFC

2. LHD

3. Apron loader and gathering arm

4. SDL

(a) P-C-1, Q-D-3, R-A-2, S-B-4

(b) P-C-1, Q-A-3, R-B-4, S-D-2\*

(c) P-C-1, Q-A-4, R-B-3, S-D-2

(d) P-B-3, Q-C-2, R-A-1, S-D-4 (GATE 2019)

1902. A shovel operates 300 days in a year, 2 shifts in a day, and 4 hours in a shift to achieve