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සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

නව නිර්දේශය/புதிய பாடத்திட்டம்/New Syllabus

NEW ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2020
General Certificate of Education (Adv. Level) Examination, 2020

ඉංජිනේරු තාක්ෂණවේදය I
பொறியியற் தொழினுட்பவியல் I
Engineering Technology I

65 E I

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Instructions:

* *Answer **all** questions.*
* *Write your **Index Number** in the space provided in the answer sheet.*
* *Instructions are given on the back of the answer sheet. Follow them carefully.*
* *In each of the questions **1** to **50**, pick one of the alternatives from (1), (2), (3), (4), (5) which is **correct** or **most appropriate** and **mark your response on the answer sheet with a cross** (×) in accordance with the instructions given at the back of the answer sheet.*
* *Each question carries **01** mark totalling to **50**.*
* ***Use of non-programmable calculators is allowed.***

1. A Vernier caliper shows a reading of 10.10 mm when measuring a true length of 10 mm, because it has a zero error. What would be the reading, when taking a measurement of true length of 20 mm?

(1) 19.80 mm (2) 19.90 mm (3) 20.00 mm (4) 20.10 mm (5) 20.20 mm

2. What is the abbreviated name representing the standard which is largely used when selecting lubricating oil for motor vehicles?

(1) BSI (2) CIDA (3) ISO (4) SAE (5) SLSI

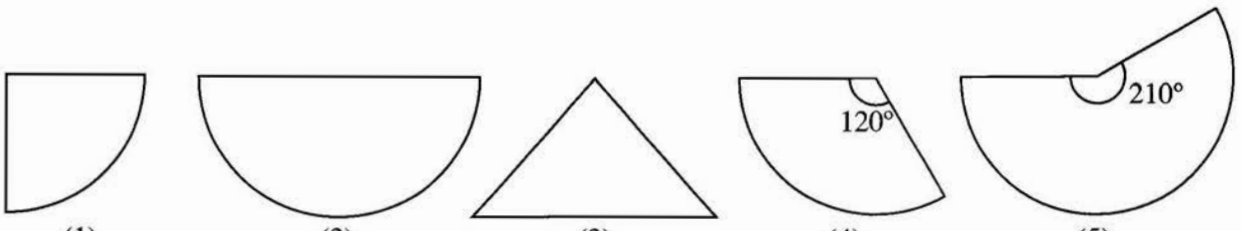
3. Consider the following statements about manufacturing of traditional medicinal products locally.

A - New technology must be used to produce medicinal products.
B - Traditional medicinal products have to be presented to the market to match the busy life style.
C - Research must be carried out to improve medicinal value of products.

Mostly relevant statement/s out of the above for developing an export market for locally manufactured traditional medicinal products is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

4. If the base diameter of a bottomless hollow cone is equal to its inclined height, what is the correct development drawing for it?



(1) (2) (3) (4) (5)

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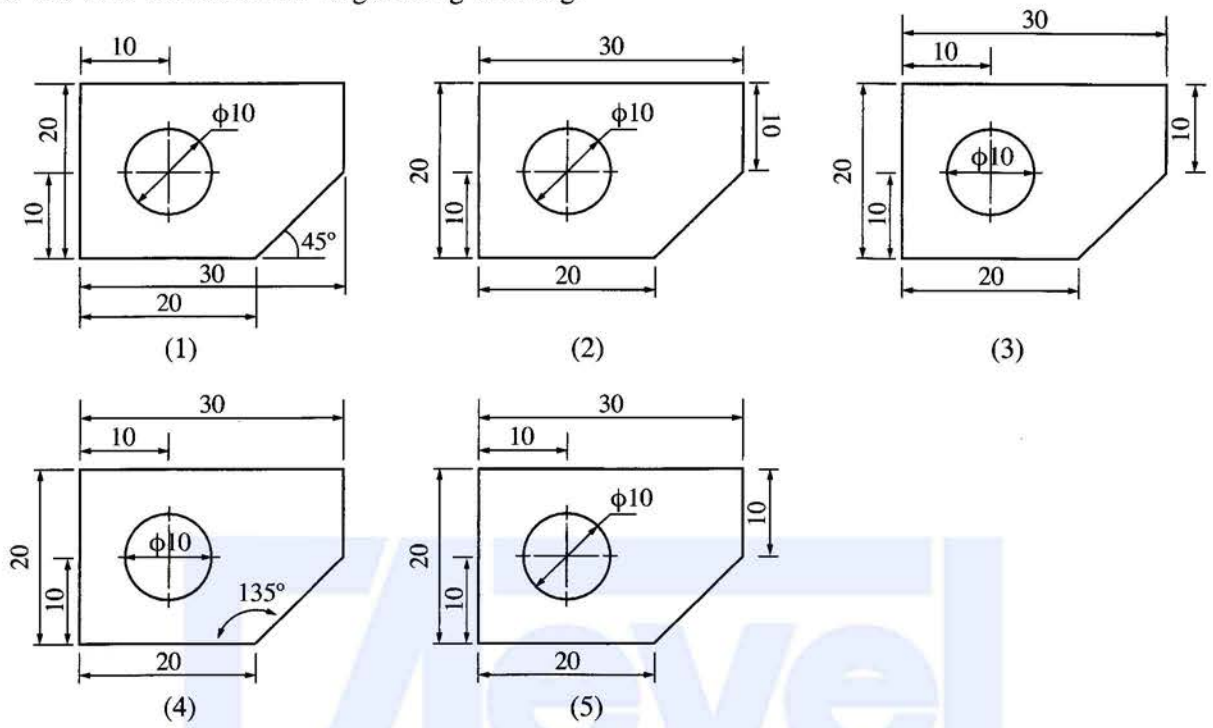
5. Out of the drawings shown below, which drawing has correctly presented the dimensions according to the SLS standards for engineering drawing?



6. What is the most important management skill that an entrepreneur should strive to improve for minimising the risks that a business may face?

(1) Planning (2) Organising (3) Leading
(4) Communicating (5) Controlling

7. Consider the following management activities.

A - Accounting
B - Competitive analysis
C - Production planning

The activity/activities which must be used for preparing a business plan is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

8. Some materials used in fire extinguishing are given below.

A - Water
B - Foam
C - Carbon dioxide (CO_2)
D - Wet chemicals

Out of the above materials, the materials suitable for putting out a fire caused by liquid fuels are

(1) A and B. (2) A and C. (3) B and C.
(4) B and D. (5) C and D.

9. According to the SLS standard, the correct relationship between the length and the other relevant dimensions of an engineering brick is

(1) length = (2 × width) + mortar joint thickness
(2) length = (2 × width) + height + mortar joint thickness
(3) length = (2 × width) + (2 × mortar joint thickness)
(4) length = width + height + mortar joint thickness
(5) length = width + (2 × height) + mortar joint thickness

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10. A common characteristic of the coarse aggregates which are used as a raw material in the production of concrete is
(1) having a flat shape.
(2) being properly graded.
(3) the water absorption being more than 20% of weight.
(4) the ability to be broken down into smaller pieces.
(5) reacting well with cement.

11. According to the building construction regulations, a fact which is **not** relevant to the prevention of accidents to the building users is
(1) the space between the building and high tension power line.
(2) the relationship between the window area and the recommended window area in the building.
(3) the minimum height of a room, which has a slanted roof.
(4) the vertical height between the beams and the floor level in the building.
(5) the minimum headroom of a stairway.

12. The property of concrete which makes it very popular in the construction industry, for constructing various shapes is
(1) hardness. (2) water tightness. (3) non-porosity.
(4) plasticity. (5) strength.

13. Several statements relevant to concrete technology are given below.
A - Shear reinforcements of concrete beams must be close to each other at each of the two ends, amounting to an extent of $\frac{1}{3}$ of the beam length.
B - In extending the length of reinforcement bars, a sufficient additional length should be allowed for joining bars and such additional length is called as lap length.
C - The test that is done for ensuring the correctness of the ratio between water and cement in a concrete mixture is known as slump test.
The correct statement/statements of the above statements is/are
(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

14. The main purpose of using water traps in sewer-pipe systems is to
(1) use as a junction for obtaining a suitable slope for the pipe system.
(2) connect sewer lines to each other conveniently.
(3) prevent unclean gasses from getting into the building environment.
(4) prevent blocking of pipe lines.
(5) retain the debris such as sand that can block the main line.

15. Some steps of purification of river water is given below.
A - removal of dissolved gases in water.
B - removal of bacteria in water.
C - removal of suspended particles in water.
The most suitable methodologies that are used in above steps A, B and C respectively are
(1) aeration, disinfection and filtration.
(2) disinfection, aeration and flocculation followed by sedimentation.
(3) aeration, disinfection and flocculation followed by sedimentation.
(4) aeration, flocculation followed by sedimentation and screening.
(5) flocculation followed by sedimentation, screening and disinfection.

[See page four

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16. Several strategies used at present for waste management are given below.

A - Placing bins at public places to collect plastic bottles.
B - Encouraging to bring meals in stainless steel containers.
C - Separating digestible components from garbage for composting.

Waste management methods that are planned to implement by the above A, B and C strategies are respectively

(1) reuse, reduce and recover.
(2) recover, recycle and reduce.
(3) recycle, reuse and recover.
(4) recycle, reuse and reduce.
(5) reduce, reuse and recycle.

17. Consider the following statements regarding the documents used by a quantity surveyor.

A - Query sheet is the document for keeping records of delays in the work site.
B - Abstract sheet is the document for recording the summary of taking off sheet.
C - The first part of the bill of quantities (BOQ) is the pricing preamble.

Out of the above statements, the correct statement/s is/are

(1) A only. (2) B only. (3) A and B only.
(4) A and C only. (5) B and C only.

18. Consider the following statements regarding the calculation of unit rate used in quantity surveying.

A - When the discount in purchasing raw material decreases, relevant unit rate increases.
B - When the wastage during the usage of raw materials increases, unit rate increases.
C - When the hiring charges for machinery increase, the unit rate increases.

Out of the above statements the correct statement/s is/are

(1) A only. (2) C only. (3) A and B only.
(4) B and C only. (5) A, B and C all.

19. If the distance between points *A* and *B* in a map drawn to a scale of 1:10 000 is 10 cm, when the same two points are shown in a map of 1:50 000, the distance between them will be

(1) 1 cm. (2) 2 cm. (3) 3 cm. (4) 4 cm. (5) 5 cm.

20. In a levelling process, the levelling staff readings taken from a single instrument station to three points *A*, *B* and *C* are respectively 3.0 m, 1.5 m and 2.5 m. It is required to prepare the land so that the points *B* and *C* will be on the same levelling plane represented by point *A*. The actions that have to be taken for this are

	Point *B*	**Point *C***
(1)	Excavation of 1.5 m	Excavation of 2.5 m.
(2)	Filling of 0.5 m	Filling of 0.5 m.
(3)	Excavation of 0.5 m	Filling of 0.5 m.
(4)	Excavation of 1.5 m	Excavation of 0.5 m.
(5)	Filling of 0.5 m	Excavation of 0.5 m.

21. The following factors are considered in locating survey stations.

A - Inter-visibility between any two adjoining stations
B - Ability to locate triangles in the land as appropriate
C - Ease of taking offsets to land features

Among the above factors, the factor/s that should be taken into consideration in selecting a location for a survey station used in a theodolite survey with a traverse is/are

(1) A only. (2) A and B only. (3) A and C only.
(4) B and C only. (5) A, B and C only.

[See page five

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22. Consider the following two statements regarding the way triangulation is practically used in chain surveying.

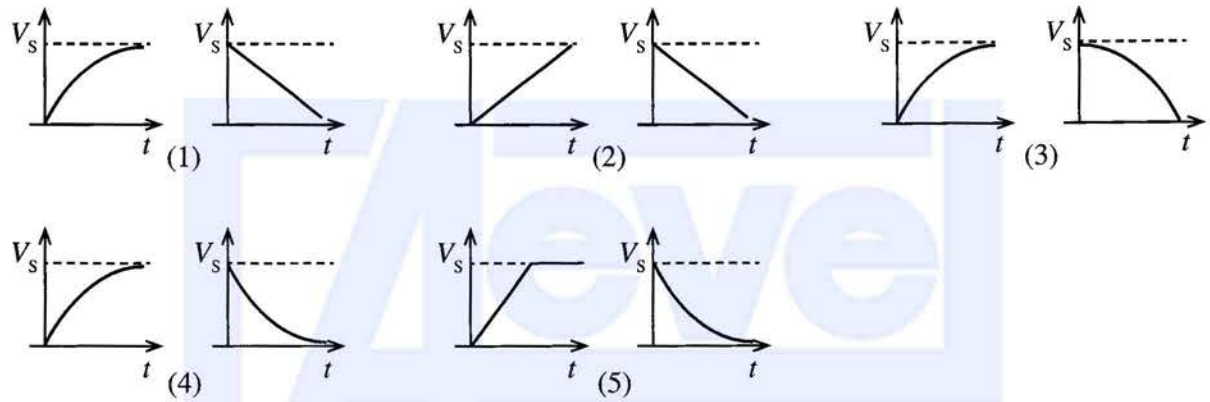
A - Only well-conditioned triangles should be used.

B - Only straight line lengths are measured whereas the only geometric shape that could be drawn with only linear measurements is a triangle.

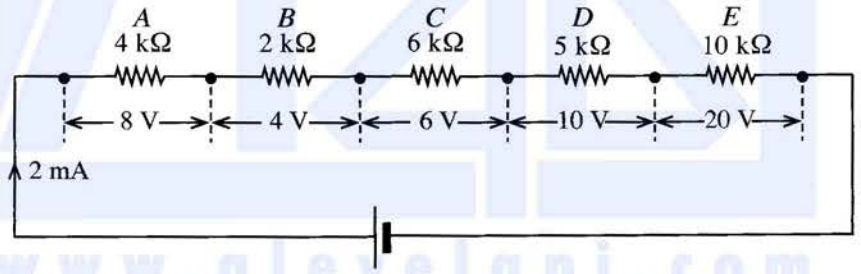
Out of the above two statements

(1) only A is correct.
(2) only B is correct.
(3) both A and B are correct. B clarifies the practical application of A.
(4) both A and B are correct. B does not clarify the practical application of A.
(5) both A and B are incorrect.

23. Which diagram respectively depicts the charging of a capacitor through a resistor to its supply voltage (V_S) and discharging of the charged capacitor through the resistor?



24. *A*, *B*, *C*, *D* and *E* denote five resistors with their rated values. The measured potential differences across each resistor and the current in the circuit are indicated in the diagram.



The defective resistor in the above circuit is

(1) *A*. (2) *B*. (3) *C*. (4) *D*. (5) *E*.

25. Consider the following statements regarding the use of high voltages in electrical power transmission.

A - Power transmission efficiency can be increased.

B - Generation voltage is normally higher than transmission voltage.

C - Cost for electrical cables can be minimized.

Out of the above statements, the correct statement/s is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) A and C only.

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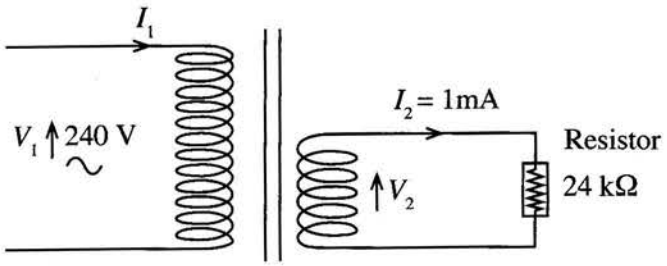
26. Shown in the figure is a loss-free step-down transformer.



Current flowing in the primary winding of this transformer is

(1) 0.001 mA. (2) 0.01 mA. (3) 0.1 mA. (4) 10 mA. (5) 100 mA.

27. Consider the following statements related to three-phase induction motors.

A - To reduce starting current, Star-Delta starters are used.

B - Direction of rotation can be changed by interchanging any two phases of the electric supply.

C - Starting torque should be provided by capacitors.

Out of the above statements, the correct statement/s is/are

(1) A only. (2) B only. (3) C only.

(4) A and B only. (5) B and C only.

28. Consider the following statements related to direct current series wound motors.

A - Starting torque is high relative to the other direct current motors.

B - While the motor is running, load should not be decoupled.

C - Can also be operated with an alternating current power supply.

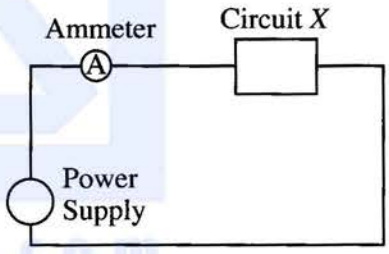
Out of the above statements, the correct statement/s is/are

(1) A only. (2) B only. (3) C only.

(4) A and B only. (5) A, B and C all.

29. Consider the following observations regarding the circuit X shown in the figure.

- When connected to a direct current power supply, a current of 100 mA flows continuously.
- Having connected to an alternating current power supply, when the voltage is increased while maintaining the frequency constant, the current flowing increases.
- Having connected to an alternating current power supply, when the frequency is increased while maintaining the voltage constant, the current flowing decreases.



According to the above observations, the circuit X could be

(1) only a resistor.

(2) only a capacitor.

(3) a capacitor connected in series with a resistor.

(4) an inductor connected in series with a resistor.

(5) a resistor, an inductor and a capacitor connected in series.

30. Consider the following statements regarding intrinsic semiconductors.

A - At the room temperature the number of free electrons and the number of holes are equal.

B - Only the free electrons contribute to the current.

C - N-type semiconductors are formed by doping with third group elements.

Out of the above statements, correct statement/s is/are

(1) A only. (2) B only. (3) C only.

(4) A and B only. (5) A and C only.

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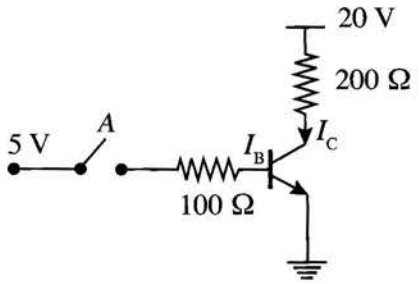
31. The circuit shows a transistor used as a switch.

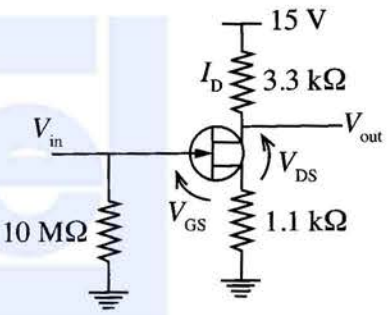


(At the saturation V_{BE} = 0.7 V and V_{CE} = 0)

When switch A is closed, base current (I_B) and collector current (I_C) of the transistor respectively are

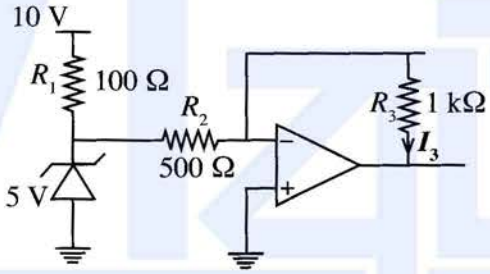
(1) 0.043 A and 0.1 A.
(2) 0.05 A and 0.05 A.
(3) 0.05 A and 0.1 A.
(4) 0.193 A and 0.1 A.
(5) 0.2 A and 0.1 A.

32. The circuit shows a Junction Field Effect Transistor (JFET) used as an amplifier. If the drain current (I_D) is 2 mA, V_{GS} and V_{DS} respectively are



(1) –2.2 V and 0 V.
(2) –2.2 V and 6.2 V.
(3) 0 V and 6.2 V.
(4) 0 V and 15 V.
(5) 2.2 V and 6.2 V.

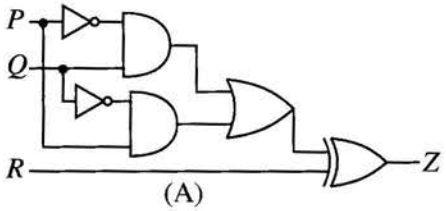
33. Consider direct current circuit shown in the figure.



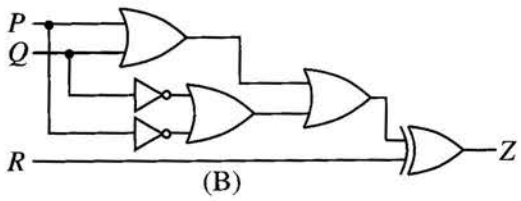
I_3 current in the above circuit is

(1) 0.001 A. (2) 0.005 A. (3) 0.01 A. (4) 0.05 A. (5) 0.1 A.

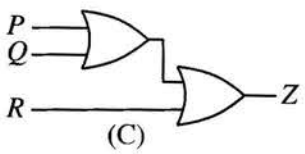
34. Consider the following proposed logic circuits for controlling a bulb (Z) in a long corridor using three switches (P, Q and R) in different places.



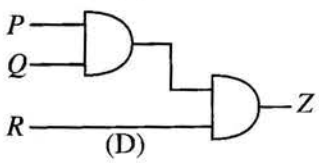
(A)



(B)



(C)



(D)

Which circuit/circuits can be used for the above requirement?

(1) (A) only
(2) (B) only
(3) (A) or (B) only
(4) (A) or (C) only
(5) (B) or (D) only

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35. Consider the following statements about analogue and digital signals.

A - In a given situation, digital signals can have only one value from two constant values while analogue signals can have any value in a certain range.
B - The effect of noise on digital signals is relatively less than that of analogue signals.
C - Digital signals can be stored relatively easier than analogue signals.

Out of the above statements, the correct statement/s is/are

(1) A only. (2) A and B only. (3) A and C only.
(4) B and C only. (5) A, B and C all.

36. Consider the following statements about modulation.

A - The frequency of the carrier is greater than the frequency of the signal.
B - In frequency modulation, frequency of the carrier is varied according to the amplitude of the signal.
C - In amplitude modulation, amplitude of the carrier is varied according to the frequency of the signal.

Out of the above statements, the correct statement/s is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) A and C only.

37. Some properties of lubricant oils used in automotive engines are given below.

A - Viscosity
B - Heat conductivity
C - Surface wettability
D - Flash point

Out of the above, the most influential properties for lubrication are

(1) A and B only. (2) A and C only. (3) A and D only.
(4) B and C only. (5) A, B, C and D all.

38. Which of the following gases will be converted into other gases by a two-way catalytic converter?

(1) Unburnt hydrocarbons, nitrogen oxides and carbon monoxide
(2) Unburnt hydrocarbons and nitrogen oxides
(3) Unburnt hydrocarbons and carbon monoxide
(4) Nitrogen oxides and carbon monoxide
(5) Unburnt hydrocarbons

39. In a motor car, it was observed that the inner edge of only the right front wheel has worn out abnormally. The cause for this could be, faulty

(1) Toe in. (2) Toe out. (3) Caster angle.
(4) Camber angle. (5) Turning angle.

40. Consider the following statements regarding a Diesel engine.

A - Emits black smoke in sudden acceleration.
B - Emits white smoke in cold start.
C - Emits blue smoke in driving.

Out of these, the observation/s that can be seen due to worn out piston rings is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) A, B and C all.

41. What is the **incorrect** statement regarding centrifugal pumps?

(1) When the static head increases the liquid flow rate reduces.
(2) The outlet pressure of the liquid increases as a result of the gradually enlarging shape of the housing.
(3) The impeller increases the pressure of the liquid.
(4) Normally a centrifugal pump should be filled with the liquid before first use.
(5) The suction head of the pump should not exceed the atmospheric pressure head.

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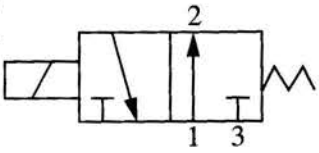
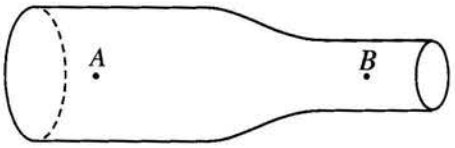
42. Depicted by the hydraulic symbol shown in the figure is

(1) a manually operated 3 port 2 position (3/2) directional control valve.
(2) a manually operated 2 port 3 position (2/3) directional control valve.
(3) a solenoid operated 2 port 3 position (2/3) directional control valve.
(4) a solenoid operated 3 port 2 position (3/2) directional control valve.
(5) a solenoid operated 3 port 3 position (3/3) directional control valve.



43. The following figure shows a horizontal venturi tube used in fluid machinery.



When a non-viscous, incompressible fluid with a density of 1000 kg/m^3 is flowing steadily from A to B, the pressure at A is 2×10^5 Pa and the average speed across A is 10 m/s. If the cross sectional area of A is twice the cross sectional area of B, pressure at B in Pa is

(1) 0. (2) 0.5×10^5. (3) 1×10^5. (4) 1.5×10^5. (5) 2×10^5.

44. The special power transmission component included in the free wheel, fixed to the rear wheel of bicycles is the

(1) bearing. (2) coupling. (3) clutch. (4) ratchet. (5) flywheel.

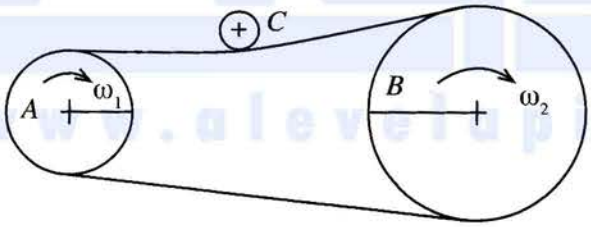
45. Consider the following machines.

A - Piston engine
B - Electric Drilling machine
C - Grinding machine
D - Mechanical Forging machine
E - Shaping machine

Out of the above machines, the machines with motion conversion mechanisms are

(1) A, B and C. (2) A, C and D. (3) A, D and E.
(4) B, D and E. (5) C, D and E.

46. In the frictionless chain drive shown in the figure, the diameter of driving wheel A is 100 mm and the diameter of driven wheel B is 400 mm. C is a tension wheel.



If the torque applied to wheel A is 200 N m, how much is the torque applied to wheel B?

(1) 50 N m (2) 100 N m (3) 200 N m (4) 400 N m (5) 800 N m

47. What property of copper is used in the production process of wire drawing?

(1) hardness (2) plasticity (3) ductility (4) elasticity (5) brittleness

48. Consider the following statements on standards and specifications.

A - Specifications are enforced processes relevant to a large number of certain institutions.
B - Parameters such as geometric, mechanical, electrical and chemical of a product produced by a manufacturer are known as specifications.
C - Standards are parameters which can always be fulfilled but specifications are not like that.

Out of the above statements, the correct statement/statements is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

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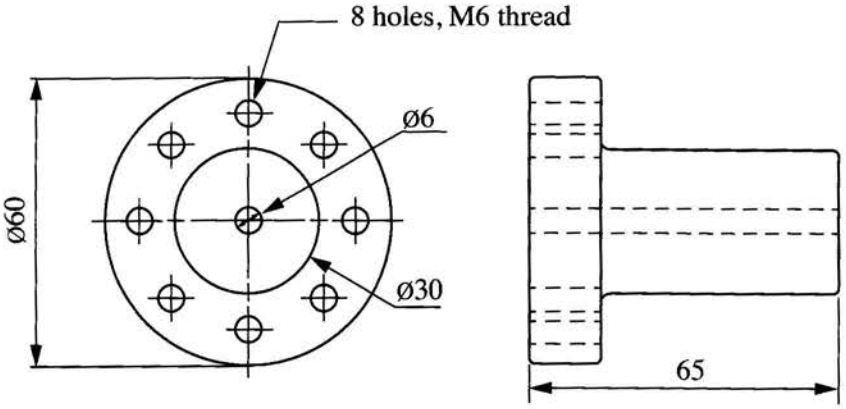
49. The machine part shown in the figure is required to be manufactured from a 63 mm diameter metal rod.



The machines which are required to manufacture the above part are

(1) milling machine and boring machine.
(2) lathe machine and milling machine.
(3) milling machine and drilling machine.
(4) lathe machine and boring machine.
(5) lathe machine and drilling machine.

50. Consider the following manufacturing methods.

A - Welding
B - Riveting
C - Glueing

Out of the above methods, the suitable manufacturing method/s for permanent assembly of metal parts is/are

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) A and C only.

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