

KD
Campus
K D Campus Pvt. Ltd

2007, OUTRAM LINES, 1ST FLOOR, NEAR GTB NAGAR METRO STATION, GATE NO. - 2, DELHI-110009

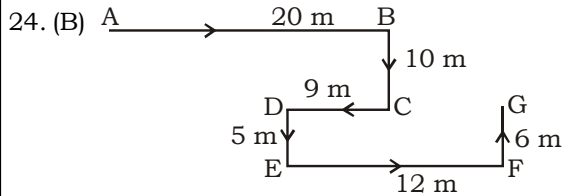
Answer-key & Solution

SSC JE (MECH)
Practice Set-13

1. C	26. D	51. D	76. B	101. D	126. C	151. C	176. D
2. D	27. A	52. C	77. A	102. D	127. C	152. D	177. D
3. B	28. C	53. B	78. B	103. C	128. A	153. B	178. B
4. D	29. A	54. B	79. C	104. C	129. D	154. C	179. B
5. B	30. B	55. D	80. B	105. A	130. C	155. B	180. B
6. A	31. B	56. A	81. C	106. B	131. D	156. D	181. A
7. D	32. D	57. D	82. C	107. B	132. B	157. B	182. C
8. D	33. B	58. B	83. B	108. D	133. C	158. B	183. B
9. A	34. C	59. C	84. C	109. A	134. C	159. D	184. B
10. D	35. D	60. C	85. B	110. B	135. A	160. A	185. B
11. C	36. A	61. C	86. C	111. B	136. C	161. C	186. B
12. A	37. B	62. D	87. C	112. B	137. D	162. D	187. B
13. B	38. D	63. D	88. C	113. B	138. D	163. C	188. A
14. D	39. C	64. A	89. C	114. C	139. C	164. C	189. B
15. D	40. B	65. D	90. C	115. C	140. A	165. C	190. A
16. A	41. C	66. A	91. B	116. B	141. A	166. B	191. D
17. C	42. A	67. B	92. D	117. A	142. B	167. C	192. A
18. D	43. D	68. C	93. D	118. C	143. A	168. C	193. A
19. B	44. C	69. B	94. C	119. B	144. B	169. B	194. C
20. D	45. C	70. A	95. D	120. C	145. A	170. D	195. D
21. B	46. D	71. B	96. D	121. D	146. D	171. B	196. B
22. A	47. D	72. A	97. C	122. D	147. A	172. A	197. A
23. D	48. B	73. A	98. B	123. B	148. B	173. D	198. C
24. B	49. A	74. C	99. C	124. D	149. D	174. C	199. C
25. C	50. C	75. C	100. A	125. B	150. B	175. C	200. B

Note : *If your opinion differ regarding any answer, please message the mock test and Question number to 8375805483*

Note : *If you face any problem regarding result or marks scored, please contact : 9313111777*



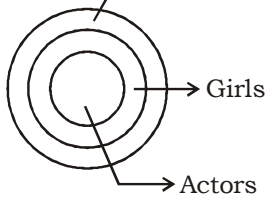
Now the dog is facing the North direction.

25. (C) Clearly, from 1 to 100, there are ten numbers with 3 as the unit's digit (3, 13, 23, 33, 43, 53, 63, 73, 83, 93).

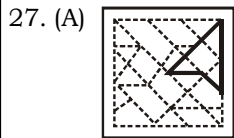
Ten numbers with 3 as the ten's digit (30, 31, 32, 33, 34, 35, 36, 37, 38, 39).

So, required number = 10 + 10 = 20.

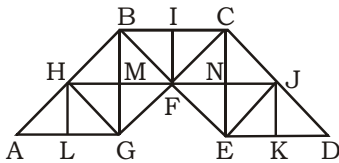
26. (D) Beautiful 1. ✓ 2. ✓



Both (1) and (2) follows



28. (C) The figure may be marked as shown.

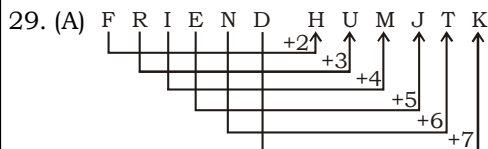


The simplest triangles are AHL, LHG, GHM, HMB, GMF, BMF, BIF, CIF, FNC, CNJ, FNE, NEJ, EKJ and JKD i.e. 14 in number.

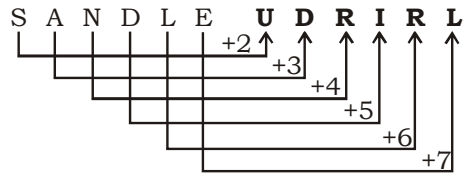
Triangles composed of two components are AGH, BHG, HBF, BFG, HFG, BCF, CJF, CJE, JEF, CFE and JED i.e. 11 in number.

Triangles composed of four components are ABG, CBG, BCE and CED i.e. 4 in number.

Total number of triangles in the given figure = 14 + 11 + 4 = 29.



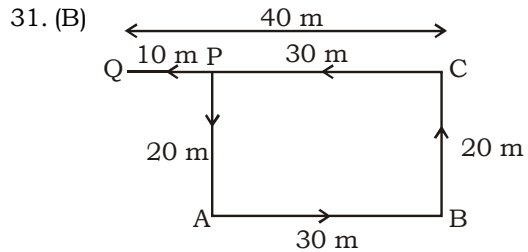
Similarly,



30. (B) Captain is also one of the member of a group.

So, we can say that in 16 persons one captain is also included.

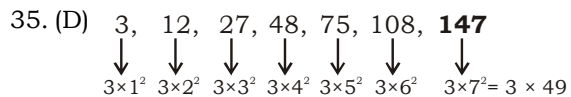
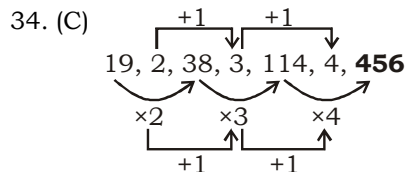
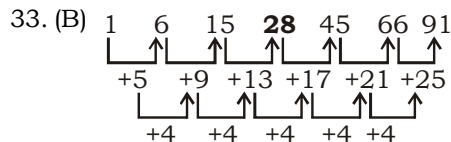
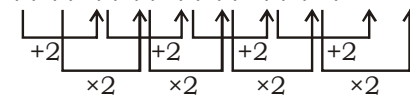
∴ The number of captains = 1200/16 = 75



Distance from the P to Q is 10 metres and direction of Q with reference to P is West.

32. (D) Below mentioned are the two series which we can observe here :-

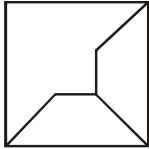
{1} {2}, {3} {4}, {5} {8}, {7} {16}, {9} {32}



36. (A) From 1st and 4th dice, after moving in a clockwise direction we have,

Yellow Blue Orange
↓ ↓ ↓
Yellow Rose Red

Here, violet colour is missing as it is opposite to yellow.

37. (B) Let Sunita's present age = x years
Then Reena present age = $2x$ years
Three years ago
 $(2x - 3) = 3(x - 3)$
 $2x - 3 = 3x - 9$
 $\Rightarrow x = 6$
Reena's age = $2x = 2 \times 6 = 12$ years.
38. (D) Use the formula $\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$.
- Where M = Number of cats.
D = Number of days.
W = Number of mice. (Here 'eating mice' is the a work)
Now, Let 4 cats would kill 4 mice in x days.
- $$\frac{100 \times 100}{100} = \frac{4 \times x}{4} \Rightarrow x = 100$$
- So, 4 cats would kill 4 mice in 100 days.
39. (C) $(6 + 5) - (7 + 4) = 0$
and $(7 + 6) - (8 + 4) = 1$
Therefore $(11 + 2) - (2 + 0) = 11$.
40. (B) $(15 + 12)/9 = 3$
and $(44 + 28)/9 = 8$
Therefore, $(64 + 53)/9 = 13$.
41. (C) $(30 - 24) \times 8 = 48$
and $(23 - 12) \times 8 = 88$
Therefore, $(92 - 86) \times 8 = 48$.
42. (A) Wheat and Paddy are different from each other but Wheat is a Rabi-Crop.
43. (D)
44. (C) 
45. (C)
46. (D)
47. (D)
48. (B)
49. (A)
50. (C)
51. (D) Ujjain (Avanti, Avantikapuri), an ancient city of Malwa region is in central India on the eastern bank of the Kshipra River. Today it is the part of the state of Madhya Pradesh. Avanti with its capital at Ujjaini is mentioned in Buddhist literature as one of the four great powers along with Vatsa, Kosala and Magadha.
52. (C) In Haryana, the Bharatiya Janata Party and the Indian National Lok Dal won all the ten seats, with each party winning 5 each.
53. (B) Nandgaon is a city and a municipal council in Nashik district in the Indian state of Maharashtra. There are two important dams in Nandgaon taluka. One is Girana Dam under major project and another is Nagya-sakya under medium project.
54. (B) The preamble to the Constitution of India is a brief introductory statement that sets out the guiding purpose and principles of the document. As originally enacted the preamble described the state as a "sovereign democratic republic". In 1976 the Forty second Amendment changed this to read "sovereign socialist secular democratic republic".
55. (D) Jim Corbett National Park is the oldest national park in India. The park has been named after the hunter and conservationist Jim Corbett who played a key role in its establishment. It was established in 1936 as Hailey National Park which is situated in Nainital district of Uttarakhand. The park acts as a protected area for the endangered Bengal tiger of India, the secure survival of which is the main objective of Project Tiger, an Indian wildlife protection initiative.
56. (A) The Ajanta Caves is in Aurangabad district of Maharashtra. The caves include paintings and sculptures considered to be masterpieces of Buddhist religious art (which depict the Jatak tales). The Ajanta cave paintings depict the life of Gautam Buddha.
57. (D) Steel Authority of India Limited is one of the largest state-owned steel-making company based in New Delhi (India) and it is one of the top steel makers in World. Major plants owned by SAIL are located at Bhilai, Bokaro, Durgapur, Rourkela, Burnpur (near Asansol) and Salem.
58. (B) The money bill originates only in the Lok Sabha. No money bill can be introduced in the Lok Sabha without the prior approval of the president.
59. (C) English education was officially introduced in India in 1935 by Governor-General William Bentinck. The English Education Act was a legislative Act of the Council of India in 1835 giving effect to a decision in 1835 by William Bentinck.
60. (C) 'Part III - Fundamental Rights' is a charter of rights contained in the Constitution of India. It guarantees civil liberties such that all Indians can lead their lives in

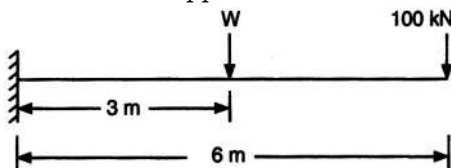
- peace and harmony as citizens of India. These include individual rights which is common to most liberal democracies such as equality before law, freedom of speech, expression and peaceful assembly, freedom to practice one's own religion, and the rights by means of writs such as habeas corpus.
62. (D) Disposable income is total personal income minus personal current taxes. In national accounts definitions, personal income minus direct taxes equals disposable personal income.
64. (A) The modern Indian Forest Service was created on 1st July 1966 under the All India Services Act 1951 for protection, conservation and regeneration of forest resources. It is one of the three All India Services of the Government of India.
67. (B) Ibn Batuta (also known as Shams-ud-din) was a Berber Muslim Moroccan explorer. He was known for his extensive travelling.
74. (C) The Reserve Bank has introduced banknotes in the Mahatma Gandhi Series since 1996 and has so far issued notes in the denominations of Rs. 5, Rs. 10, Rs. 20, Rs. 50, Rs. 100, Rs. 500 and Rs. 1000 in this series. Mahatma Gandhi series of Rs. 50 notes has the picture of Parliament of India on its reverse.
78. (B) The 'NOSHAD' attribute in HTML specifies that a horizontal line should render in one solid color (on shaded), instead of a shaded color. So, it displays the line in red.
79. (C) The first Law Commission was established in 1834 under the Charter Act of 1833 under the Chairmanship of Lord Macaulay which recommended codification of the Penal Code, the Criminal Procedure Code and a few other matters. Thereafter, the second, third and fourth Law Commissions were constituted in 1853, 1861 and 1879 respectively.
82. (C) A continent sized hole has been formed over Antarctica as a result of damage to the ozone layer. Most of the ozone is formed in the stratosphere over the equator and spreads by winds around the globe. Icy particles in polar stratospheric clouds catalyse the release of chlorine (from CFC) which destroys ozone. The formation of Ozone hole is maximum because in winter there is exceptionally cold.
83. (B) Eugen Steinach discovered the sex hormones in 1922. He conducted experiments in the transplantation of a male guinea pig's testes into a female and the castration of the male. Now the testes secretion is known as testosterone resulted in the female guinea pig developing male sexual behaviour such as mounting the partner. This led Steinach to theorize that the gland's secretions were responsible for sexuality.
84. (C) The most prevalent bulk material for solar cells is crystalline silicon (abbreviated in a group as c-Si). It is also known as "solar grade silicon".
85. (B) All true crabs have 10 legs that are arranged in pairs. The front most is modified into pincers and other four pairs are used for locomotion. For some swimming crabs, the hindmost pair of legs is flattened to form paddles.
86. (C) A hydrogen balloon floats up because weight of balloon is less than the weight of air displaced by it. When an object is less dense than a fluid, then the object will float as the buoyant force exerted on the object by the fluid is greater than the force of gravity on the object.
89. (C) Robert Koch was a German physician. He became famous for isolating Bacillus anthracis (1877), the Tuberculosis bacillus (1882) and Vibrio cholerae (1883) and his development of Koch's postulates. He was awarded the Nobel Prize in Physiology or Medicine in 1905 for his findings in tuberculosis. He is considered one of the founders of microbiology.
93. (D) Open circulatory system is the one in which blood does not circulate only inside blood vessels, but it also falls in cavities that irrigate tissues. The internal organs are suspended in a network of blood-filled sinuses or open spaces which collectively form the haemocoel.
97. (C) Polytetrafluoroethylene (PTFE) is a synthetic fluoropolymer of tetrafluoroethylene that finds numerous applications. The best known brand name of PTFE is Teflon. PTFE is used as a non-stick coating for pans and other cookware as it is hydrophobic and possesses fairly high heat resistance.
99. (C) It is because the night side of Earth will radiate infra-red radiation (heat) back into the space. When there is cloud cover, the clouds act like a blanket and trap the heat just like a blanket traps heat close to our body.

110. (B) Pressure in the water main,
 $p = \rho gh = 1000 \times 10 \times 100 = 10^6 \text{ N/m}^2$

$$\text{Hoop stress } \sigma = \frac{pd}{2t}$$

$$\therefore t = \frac{pd}{2\sigma} = \frac{10^6 \times 1}{2 \times (25 \times 10^6)} = \frac{1}{50} \text{ m} = 20 \text{ mm}$$

112. (B) Maximum bending moment occurs at the fixed support.



$$\therefore 900 = 100 \times 6 + W \times 3; W = 100 \text{ kN}$$

113. (B) From torsion equation for a shaft

$$\frac{T}{J} = \frac{\tau_s}{r}$$

$$\text{or } \tau_s \propto \frac{T(\text{torque})}{J(\text{polar moment of inertia})}$$

114. (C) $\frac{\tau}{r} = \frac{G\theta}{l}; \theta = \frac{\tau l}{r G}$

$$= \frac{50 \times 8000}{40 \times (80 \times 10^3)} = 0.125 \text{ radian}$$

116. (B) Refer relation $\frac{P}{A} = \frac{n \pi^2 E}{(l/k)^2}$ for the design

of columns. The parameter (l/k) called slenderness ratio will be least for the end fixation which has lowest value for the factor n and that is provided by a fixed-free column.

118. (C) The relative motion between the elements or links that form a kinematic pair is required to be completely or successfully constrained.

121. (D) The effort of a governor is the mean force exerted at the sleeve for a given percentage change in speed

$$\therefore \text{Effort} = 300 \times \left(\frac{200 - 150}{150} \right) = 100 \text{ N}$$

124. (D) The coefficient of fluctuation of energy is defined as the ratio of the maximum fluctuation of energy to the work done per cycle.

125. (B) The two non-parallel or intersecting, but coplanar shafts are connected by bevel gears. When the bevel gears have their teeth inclined to the face of the bevel, they are known as helical bevel gears.

126. (C) Non-parallel and non-intersecting axis with curved teeth. The distance between two shafts is called offset. If offset is zero, hypoid gears become spiral bevel gears.

128. (A) Module represents the ratio of pitch circle diameter (in mm) to the number of teeth. Obviously, the module is the reciprocal of diametral pitch.

130. (C) Tensile strength of cast iron varies in the range 500 to 840 MPa.

133. (C) Riveted lap joint is recommended for circumferential joint in a boiler.

136. (C) The grain structure gets distorted and the resistance to working keeps on increasing due to the lattice distortion.

139. (C) A gagger is small L-shaped metallic accessory used in floor moulds to help support hanging bodies of sand in a core.

143. (A) In electric arc welding, the arc is created by low voltage, high current supply.

148. (B) In oblique cutting system, the cutting edge of the tool may or may not clear the width of the work piece. However, in orthogonal cutting system; the cutting edge clears the width of the work piece on either ends.

153. (B) Amongst all the forces the magnitude of tangential component of force is largest and accordingly it is used for calculating the power consumption in metal cutting.

154. (C) Mandrel is a solid steel shaft for holding finished bored parts for machining their outside surfaces.

158. (B) The quantity of matter constituting a system changes when the system is open.

160. (B) Number of components (C), phases (P) and degrees of freedom (F) are correlated by Gibbs phase rules as $P + F - C = 2$
 For a pure substance, $C = 1$
 Phase present $P = 3$

$$\therefore 3 + F - 1 = 2; F = 0$$

161. (C) For path acb,

$$80 = 30 + (u_b - u_a)$$

$$\text{or } u_b - u_a = 50 \text{ kJ}$$

For path a - d - b,

$$\delta Q = 10 + 50 = 60 \text{ kJ}$$

162. (D) For a cyclic process : $\oint \delta W = \oint \delta Q$

$$\therefore \text{Work done} = 0 + 20000 - 2000 - 6000 = 12000$$

$$\eta_{th} = \frac{\text{workdone}}{\text{heat supplied}} = \frac{12000}{20000} = 0.6 \text{ or } 60\%$$

165. (C) $\eta_{th} = \frac{Q_1 - Q_2}{Q_1}$. For a reversible engine, the

thermal efficiency also equals $\frac{T_1 - T_2}{T_1}$

Since the engine is reversible

$$\frac{Q_1 - Q_2}{Q_1} = \frac{T_1 - T_2}{T_1}$$

$$\frac{280 - Q_2}{280} = \frac{520 - 260}{520}; Q_2 = 140 \text{ kJ/s}$$

167. (C) Presence of oxygen in boiler feed water causes corrosion and pitting. Dissolved oxygen can be removed either by chemical treatment with sodium sulphite or by deaeration.

168. (C) In a fire tube boiler, the flames and hot gases pass through the tubes which are surrounded by water. Lancashire boiler is a stationary, horizontal, natural circulation fire tube boiler having two flue tubes and three passes.

175. (C) The compression work depends on the actual volume of the air entering the compressor and not the clearance volume.

177. (D) Ideal fluids are inviscid and incompressible, and have no surface tension.

183. (B) For wetting liquids like water $\theta < \pi/2$ and for non-wetting liquids like mercury $\theta > \pi/2$.

189. (B) Fore one-dimensional laminar flow in x-direction

$$\frac{dp}{dx} = \frac{d\tau}{dy} = \frac{d}{dy} \left(\mu \frac{du}{dy} \right) = \mu \frac{d^2u}{dy^2}$$

190. (A) $\tau = \mu \frac{du}{dy} = \left(\frac{-dp}{dx} \right) \left(\frac{b}{2} - y \right)$

The shear stress distribution has a linear variation from a zero value at midway between the plates to a maximum value at the surface boundaries.

192. (A) Guide vanes or wicket gates are arranged inside the casing to form a number of flow passages between the casing and runner blades. They direct the water onto the runner at an angle appropriate to the design; no eddies that could cause energy losses.

193. (A) The flow ratio ψ is defined as the ratio of flow velocity at inlet V_f to the ideal velocity $\sqrt{2gH}$. Thus

$$\psi = V_f / \sqrt{2gH}$$

For Francis turbine ψ ranges from 0.15 to 0.35.

196. (B) Speed $N = \frac{120 f}{P}$ where f is frequency and P is the number of poles

$$\therefore N = \frac{120 \times 50}{12} = 500 \text{ rpm}$$

198. (C) Discharge for each suction side of the impeller,

$$Q = \frac{1.5}{2} = 0.75 \text{ m}^3/\text{s}$$

$$N_s = \frac{N\sqrt{Q}}{H^{3/4}} = \frac{750 \times \sqrt{0.75}}{(16)^{3/4}} = 81.19$$

Since N_s lies between 80 and 160, the task will be accomplished by a mixed flow pump.

199. (C) Power input to pump,
 $= \omega Q (H + h_f)$
 $= 9810 \times 0.1 \times (10 + 5)$
 $= 14715 \text{ W} = 14.7 \text{ kW}$

200. (B) From similarity considerations, each of the following parameters needs to be same for the model and prototype

Head coefficient $\frac{H}{N^2 D^2}$

Flow coefficient $\frac{Q}{N D^3}$

Power coefficient $\frac{P}{\rho N^3 D^5}$

Obviously for a given pump,

$$Q \propto N; H \propto N^2; P \propto N^3$$