



# KD Campus Pvt. Ltd

2007, OUTRAM LINES, 1ST FLOOR, OPPOSITE MUKHERJEE NAGAR POLICE STATION, DELHI-110009

## Answer-key & Solution

SSC JE (Mechanical)  
MOCK -(99)  
Date 27.5.2017

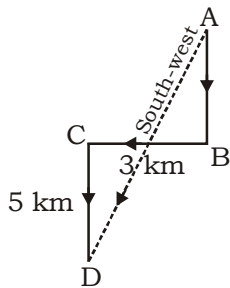
1. B	26. B	51. B	76. D	101. B	126. B	151. A	176. B
2. D	27. D	52. D	77. C	102. C	127. B	152. A	177. D
3. A	28. B	53. B	78. D	103. C	128. D	153. D	178. D
4. C	29. C	54. B	79. A	104. B	129. A	154. A	179. B
5. B	30. B	55. C	80. B	105. B	130. D	155. C	180. D
6. D	31. D	56. C	81. A	106. D	131. B	156. C	181.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

**Note :** If your opinion differ regarding any answer, please message the mock test and Question number to 9560620353

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

1. (B)  $324 \Rightarrow (3 \times 4)^2 = 144$   
 $228 \Rightarrow (2 \times 8)^2 = \mathbf{256}$
2. (D) Cat's foot is called Paw and **Horse's** foot is called hoof.
3. (A) Capital of China is Beijing and Indonesia is **Jakarta**.
4. (C) **31 June 2014** can't be found in the calendar as June month is of 30 days.
5. (B) Pronunciation of **Low** is different from other three.
6. (D)  $3 \times 4 \times 3 = 6 \times 6$   
 $2 \times 8 \times 4 = 8 \times 8$   
 $2 \times 4 \times 2 = 4 \times 4$   
 $9 \times 3 \times 8 \neq 3 \times 3$

7. (D)



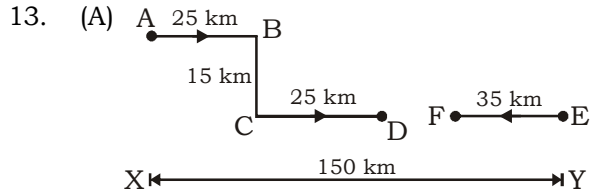
Hence, he is in **South-West** direction.

8. (A) Let the number of persons be  $x$ . Then,  
$$\frac{960}{x-4} - \frac{960}{x} = 40 \Rightarrow \frac{1}{x-4} - \frac{1}{x} = \frac{40}{960}$$
  
$$\Rightarrow \frac{x - (x-4)}{x(x-4)} = \frac{1}{24}$$
  
$$\Rightarrow x^2 - 4x - 96 = 0 \Rightarrow (x-12)(x+8) = 0$$
  
$$\Rightarrow x = 12$$
 (as the number of persons can't be negative)  
So, required number of persons =  $12 - 4 = \mathbf{8}$
9. (D)
10. (C)
 

Top	•	Blank	Blank
Bottom	□	Blank	=

Hence, only 1, 3 and 4 is similar to the box formed from the question figure.
11. (B)  $16 \times 0.5 + 1 = 9$   
 $9 \times 1 + 2 = 11$

11.  $11 \times 2 + 3 = 25$   
 $25 \times 4 + 4 = \mathbf{104}$   
 $104 \times 8 + 5 = 837$
12. (A) **Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday.**

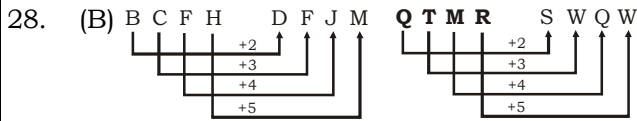


Required distance = DF  
 $= 150 - (25 + 25 + 35)$   
 $= 150 - 85$   
 $= \mathbf{65 \text{ km}}$

14. (C)
 

I. ✓  
II. ✓
15. (C) Bus and Train are different from each other but some travellers travel by bus and some travel by train.
16. (A)
 

Consonant	Vowel	Result
Hindu	3	2 $\Rightarrow 3^3 - 2^2 = 23$
Muslim	4	2 $\Rightarrow 4^3 - 2^2 = 60$
Sikh	3	1 $\Rightarrow 3^3 - 1^2 = 26$
Christian	6	2 $\Rightarrow 6^3 - 2^2 = \mathbf{212}$
17. (C) The symbols of the adjacent faces to the face with symbol \* are @, -, + and \$. Hence the required symbol is **8**.
18. (A)  $8 \times 4 \times \mathbf{5} = 160 \Rightarrow \frac{160}{10} = 16$   
 $9 \times 5 \times 4 = 180 \Rightarrow \frac{180}{10} = 18$   
 $8 \times 12 \times 5 = 480 \Rightarrow \frac{480}{10} = 48$
19. (B)  $4 \times 3 = 12 \Rightarrow 12^2 = 144$   
 $8 \times 2 = 16 \Rightarrow 16^2 = \mathbf{256}$   
 $5 \times 3 = 15 \Rightarrow 15^2 = 225$   
 $2 \times 9 = 18 \Rightarrow 18^2 = 324$
20. (C)  $5^3 - 8^2 = 125 - 64 = 61$   
 $2^5 - 4^2 = 32 - 16 = 16$   
 $3^4 - 2^6 = 81 - 64 = 17$   
 $7^3 - 18^2 = 343 - 324 = \mathbf{19}$
21. (C)
22. (B)
23. (D)
24. (D)
25. (B)  $2 \times 3 \Rightarrow (2+3) - (2 \times 3) = 5 - 6 = -1$   
 $3 \times 4 \Rightarrow (3+4) - (3 \times 4) = 7 - 12 = -5$   
 $4 \times 6 \Rightarrow (4+6) - (4 \times 6) = 10 - 24 = -14$   
 $6 \times 9 \Rightarrow (6+9) - (6 \times 9) = 15 - 54 = -\mathbf{39}$
26. (B)  $123 \Rightarrow (13)^2 = 169$   
 $126 \Rightarrow (16)^2 = \mathbf{256}$
27. (D) First is the capital of second.



29. (C)  $22 \Rightarrow 22^2 + \frac{22}{2} = 484 + 11 = 495$

$24 \Rightarrow 24^2 + \frac{24}{2} = 576 + 12 = \mathbf{588}$

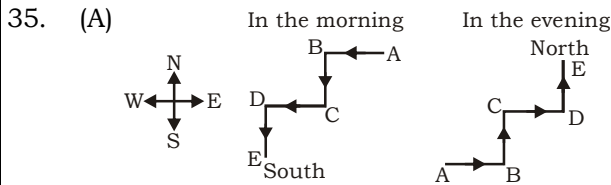
30. (B) Except **EYE**, the other words have two different vowels.

31. (D) Except **Cylinder**, other are 2-D geometrical figure.

32. (A) Only for **64**, both square root and cube root is possible.

33. (C) Except **Kurushetra**, other cities are in Punjab.

34. (D) The woman is the mother of Shashank's grand daughter. Hence, the woman is the **daughter-in-law** of Shashank.



If he starts walking in the morning then finally he will face South and if he starts in the evening then finally he will face North.

36. (C) Since B and D are twins, so  $B = D$ .

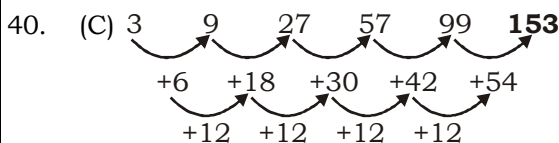
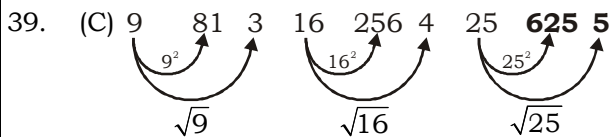
Now,  $A = B + 3$  and  $A = C - 3$ .

Thus,  $B + 3 = C - 3 \Rightarrow D + 3 = C - 3$

$\Rightarrow C - D = 6$ .

37. (C)

38. (B) As the numbers 2, 3, 4 and 5 are adjacent to 6. Hence the number on the face opposite to 6 is 1.



41. (C)  $2 \rightarrow 4 \rightarrow 1 \rightarrow 5 \rightarrow 3$

42. (B) According to the statement, sea transport is cheaper than road transport in the case of route from Bombay to Jafra, not in all the cases. So, conclusion I does not follow. The statement stresses on the saving of fuel. So, conclusion II follows.

43. (B)  $36 \Rightarrow \sqrt{36} = 6 \Rightarrow 6 + 1 = 7$

$25 \Rightarrow \sqrt{25} = 5 \Rightarrow 5 + 1 = 6$

$64 \Rightarrow \sqrt{64} = 8 \Rightarrow 8 + 1 = \mathbf{9}$

44. (C)  $(12 \times 6) - 2 = 70 \Rightarrow \frac{70}{10} = 7$

$(18 \times 3) - 4 = 50 \Rightarrow \frac{50}{10} = \mathbf{5}$

$(19 \times 4) - 6 = 70 \Rightarrow \frac{70}{10} = 7$

45. (B)  $8 + 7 + 3 = 18 \Rightarrow \frac{18}{3} = 6$

$9 + 8 + 7 = 24 \Rightarrow \frac{24}{3} = 8$

$12 + 15 + 12 = 39 \Rightarrow \frac{39}{3} = 13$

$2 + 3 + 1 = 6 \Rightarrow \frac{6}{3} = \mathbf{2}$

49. (C)  $324 \oplus 289 = 324 - 289 = 35 \Rightarrow 35^2 = 1225$

$256 \oplus 225 = 256 - 225 = 31 \Rightarrow 31^2 = 961$

$49 \oplus 25 = 49 - 25 = 24 \Rightarrow 24^2 = 576$

$186 \oplus 97 = 187 - 97 = 89 \Rightarrow 89^2 = \mathbf{7921}$

50. (B)

Front Face	A	F	E
Opposite Face	D	C	B

51. (B) China has successfully launched "Feng-Yun-4", a new generation weather satellite into geostationary orbit from the Xichang Satellite Launch Centre by a Long March-3B carrier rocket. The launch marked the 242nd mission of China's Long March series of rockets. The FY-4 series is an improved generation of geosynchronous meteorological satellites.

52. (D) The Indian Council of Food and Agriculture (ICFA) has conferred the 2016 Global Agriculture Leadership Award to Tata Sons interim Chairman Ratan Tata in Mumbai for his transformational role in scaling Tata Group as the globally admired group during his stint of two decades as Chairman. The ICFA is an apex body of India that act as think tank, policy research, trade facilitation, development catalyst and monitor centre for food and agriculture sector and serve as global platform for partnerships.

53. (B) The book "The Other One Percent: Indians in America" has been authored by Sanjoy Chakravorty and Devesh Kapur. The book is the first comprehensive and data-driven account of the selection, assimilation and entrepreneurship of Indians in America.
54. (B) In 1688, the first Municipal Corporation of India was set up in Madras.
55. (C) Indian batswoman Smriti Mandhana has been named in the ICC Women's Team of the Year 2016, which will be captained by Stafanie Taylor, a West Indies player. This is the first time that the International Cricket Council (ICC) has named a women's team of the year. Beside this, Suzie Bates of New Zealand has become the first cricketer to clinch both the ICC Women's ODI and T20 Player of the Year awards.
56. (C) International Day of Older Persons is observed on 1 October every year. On 14 December 1990, the United Nations General Assembly designated 1st October as the International Day of Older Persons. This was preceded by initiatives such as the Vienna International Plan of Action on Ageing which was adopted by the 1982 World Assembly on Ageing and endorsed later that year by the UN General Assembly.
57. (C) Temple Architecture of Cholas:
- Brihadishwara Temple of Tanjore was built by Rajaraja Chola-I.
  - Koranganatha Temple, Srinivasanallur was built by Parantaka Chola-I.
  - Airavateshwar Temple, Darasuram was built by Rajaraja Chola II, Chola-I.
  - "Kailashanatha Temple, Kanchipuram (Tamil Nadu) was built by Pallava King, Narsimhamvarman. "Kailasanatha Temple of Ellora was built by the Rashtrakuta king Krishna I.
58. (B) Photosynthesis occurs between wavelengths of about 400 nm and 750 nm. Red and blue colour wavelength is categories in this wavelength. So, plants absorb these colours. Photosynthesis does not occur in the infra-red or in ultraviolet light.
59. (B) The Haryana government has launched "Haryana Immunization Incentives and Information Programme" to increase immunization rates of children between the age group of 0-12 months. The programme would be implemented in 7 districts viz. Bhiwani, Jhajjar, Mewat, Palwal, Panipat, Rewari and Sonipat covering 140 Primary Health Centres (PHCs). The purpose of the programme is to significantly improve immunization coverage in low performing districts, especially for girls, who in all 7 districts have lower immunization rates than boys.
60. (C) The battle of Dharmat was fought between Aurangzeb and Dara Shikoh in 1658 for Shahjahan's throne. Dara Shikoh was defeated by Aurangzeb.
61. (B) The Government of India (GoI) will contribute \$500,000 to United Nations' Central Emergency Response Fund (CERF) for the year 2016-17. The CERF is a humanitarian fund to promote early and coordinated action and response to save lives, to increase response to time-crucial requirements based on demonstrable needs and to strength the core elements of humanitarian response in under-funded crises.
62. (D) First Anglo Burmese War - 1824-1826  
Third Mysore War - 1790-1792  
First Anglo-Maratha War - 1775-1782  
First Anglo - Sikh War - 1845-1846  
Second Anglo - Sikh War - 1848-1849.
63. (A) Biogas comprises mainly methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>) and small amounts of hydrogen sulphide (H<sub>2</sub>S), moisture and siloxanes.
64. (A) Average fat content in buffalo milk is 7.2% and average fat content in cow milk is 4.4%. As per the nutrient components, buffalo milk contains all the nutrients in higher proportion than cow's milk.
65. (D) According to Article 368 an amendment of the Constitution may be initiated only by the introduction of a Bill for the purpose in either House of Parliament, and when the Bill is passed in each House by a majority of the total membership of that House present and voting, it shall be presented to the President who shall give his assent to the Bill and there upon the Constitution shall stand amended in accordance with the terms of the Bill.
66. (D) Water pollution in river or any other water body is measured by amount of dissolved oxygen. Water pollution can be measured on the basis of parameters like dirtiness', change in texture, total suspended solid and other important factors.
67. (A) Washing machine works on the principle of centrifugation. Centrifugation is a process that involves the use of the centrifugal force for the separation of mixtures with a

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- centrifuge, used in industry and in laboratory settings.
68. (A) An astronomical unit (abbreviated as AU) is a unit of length equal to about 149,597,870.7 kilometers or approximately the mean Earth-Sun distance. The astronomical constant whose value is one astronomical unit is referred to as unit distance and is given by the symbol A.
70. (D) Polycarbonates are the polymer widely used in making bullet proof materials. Bullet proof glass is made by layering a polycarbonate material between pieces of ordinary glass in a process called lamination. A bullet fired will pierce the outside layer of the glass, but the layered polycarbonate glass material is able to absorb the bullet's energy and stop it. Polycarbonate panels are used for covering advertising posters, construction of office buildings for sound proofing. Polycarbonate is also used for making bullet proof jackets.
71. (B) Agricultural Produce Market Committee Acts of respective states are responsible for markets in agricultural products.
72. (D) • Air at  $0^\circ$  - 331.5 m/s  
• Water at -1493 m/s  
• Wood at - 4500 m/s
73. (A) The blood group of the parents are AB and O, the child's blood group may be A or B and since the boy is adopted and it is given in the question that " the blood group of the three sons are A+, B+, O+".
74. (A) In stormy weather condition the pressure of atmosphere varies, which causes sudden fall in barometer reading.
76. (D) The Union government has launched the "Digi-Dhan Vyapar Yojana" for Merchants and "Lucky Grahak Yojana" for Consumers in New Delhi. The purpose of the schemes is to encourage people to move towards digital transactions through the offer of incentives. Both the schemes will be implemented by National Payments Corporation of India (NPCI). For these schemes, only those transactions that take place through RuPay Cards, Unstructured Supplementary Service Data (USSD), Unified Payment Interface (UPI) and Aadhaar Enabled Payment System (AEPS) are eligible. The schemes has been launched with the first draw by the Minister for Electronics and Information Technology Ravi Shankar Prasad and Finance Minister Arun Jaitley on December 25<sup>th</sup>, 2016.
77. (C) Philosopher's wool is an oxide of zinc with a white powder used as a pigment, cosmetics, glass, inks and zinc ointment.
78. (D) Bacteria, micro algae and fungi are most widely used in industries. Bacteria like Lactobacillus sp. is used in manufacturing of vinegar and alcohol by fermentation process.  
Most of algae are used as single cell protein (i.e. Spirulina).  
Different drugs like penicillin are manufactured from fungi Penicillium notatum.
79. (A) X-ray, computed tomography (CT) is a medical imaging method employing tomography created by computer processing. This technique is used to generate a three-dimensional image of the inside of an object.
80. (B) The XXI Commonwealth Games will be held in Gold Coast City, Queensland, Australia between 4<sup>th</sup> to 15<sup>th</sup> April 2018. The Gold Coast's creative concept in the Ceremony brought to life the three brand pillars of the Gold Coast 2018 Commonwealth Games - 'The Place', 'The Event' and 'The Sport'.  
NOTE: 22<sup>nd</sup> Commonwealth Games would be held from 18<sup>th</sup> to 30<sup>th</sup> July 2022. The opening ceremony will be held on the birth date of the late South African President and Anti-apartheid leader Nelson Mandela.
81. (A) Deficiency of vitamin C causes Scurvy, a disease of gums. Deficiency of vitamin D causes Rickets, a disease of bones and Deficiency of Vitamin A causes night blindness, a disease of eyes.
82. (A) The Archaeological Survey of India established in 1861 is a department of the Government of India attached to the Ministry of Culture. ASI is responsible for archaeological studies and the preservation of archaeological heritage of the country in accordance with the various acts of the Indian Parliament.
83. (A) Antiseptic are antimicrobial substances that are applied to living tissue/skin to reduce the possibility of infection, sepsis, or putrefaction. Now phenyl being a phenol derivative possesses effective germicidal properties because phenol is germicidal in strong solution. Used in the form of a powder as an antiseptic baby powder, it has a pain killing effect as well. Example: TCP (Trichlorophenol).

85. (D) The Union Minister of Consumer Affairs, Ram Vilas Paswan has recently launched an 'Online Consumer Mediation Centre (OCMC)' in association with the Bengaluru's National Law School of India University (NLSIU) to provide speedy redressal of consumer grievances in New Delhi. Initially, the OCMC deal with only cases related to e-commerce companies and will facilitate online and even physical mediation between consumers and companies. Apart from this, ministry has also launched 'Smart Consumer' mobile App and helpline no. '14404' for consumer related grievances and also launched Microsite based on the theme "Digitally Safe Consumer Campaign" to help consumers for being vigilant and not falling prey to cyber frauds. The basic purpose of the Centre is to encourage consumers and companies to go for pre-litigation and provide them with an option to settle disputes amicably.
86. (A) A solar eclipse occurs as the moon passes in front of the sun, resulting in the earth falling into the shadow of the moon.
87. (C) According to NHRC Act 1993, only a retired CJI can become chairman of NHRC, appointed by President on the recommendation of a committee comprising of PM, Speaker of Lok Sabha, Home Minister, Leader of Opposition of both Houses of Parliament and Deputy Chairman of Rajya Sabha.
89. (D) Housed within the Carbon Finance Unit of the World Bank, the Bio Carbon Fund is a public-private sector initiative mobilizing financing to help for development of projects that conserve carbon in forest and agro-ecosystems. It was created in 2004.
90. (D) The Good Governance Day (GGD) is observed every year in India to mark the birth anniversary of former Prime Minister Atal Bihari Vajpayee. The day was established to honour Prime Minister Vajpayee by fostering awareness among the Indian people of accountability in government. From December 25<sup>th</sup>, 2016, the Good Governance campaign will be undertaken for 100 days during which Ministers and Members of Parliament (MoP) will travel across the country and attend programmes highlighting the government's key initiatives. The effort of the government is to improve delivery systems, to promote digital transformation and take forward the connectivity revolution in all sectors.
91. (D) Nitroglycerine (NG) also known as nitroglycerine, trinitroglycerin, trinitroglycerine, 1, 2, 3 - trinitroxypropane and glyceryl trinitrate is a heavy, colourless, oily, explosive liquid obtained by nitrating glycerol. Alfred Nobel discovered that mixing nitroglycerin with diatomaceous earth would turn the liquid into a paste, called dynamite. An advantage of dynamite was that it could be cylinder-shaped for insertion into the drilling holes used for mining.
93. (A) Under Article 76, impeachment procedure of the Attorney-General is not provided. He shall hold office during the pleasure of the President. He must not be a member of either House of Parliament.
94. (D) Cotton is generally considered a rainfed crop. It is also grown in areas where assured irrigation is not available. Black soils can retain water which is very useful property for rainfed crops to grow. The texture of the soil is supportive for the growth of cotton. So black soils are more suitable for cotton to grow.
95. (C) Biotech Labs in Senior Secondary Schools (BliSS) is a scheme to encourage students to consider careers in biotechnology. This scheme envisages to establish labs in North-Eastern States viz. Assam, Arunachal Pradesh, Meghalaya, Mizoram, Tripura, Nagaland, Sikkim and Manipur.
96. (B) The Part III of the Constitution of India gives a detailed description on a charter of rights called the fundamental Rights'. These fundamental rights guarantee civil freedom to all the citizens of India to allow them to live in peace and harmony. These are the basic rights that every Indian citizen has the right to enjoy, irrespective of their caste, creed and religion, place of birth, race, color or gender. These fundamental rights include Right to Equality, Right to Freedom, Right to Freedom of Religion, Cultural and Education Rights, Right against Exploitation, Right to Constitutional Remedies, etc.
98. (B) Frequency modulation: It is a process in which the frequency of the carrier is varied in accordance with the instantaneous value of modulating voltage. In tele-communications and signal

processing, frequency modulation (FM) conveys information over a carrier wave by varying its instantaneous frequency. FM is most commonly used for radio and television broadcasting.

100. (B) Keshavan from India has recently won gold at the 2016 Asian Luge Championship in Nagano, Japan. He dominated the event and finished the 2 heat race with a time of 1 minute, 39.962 seconds and top speed of 130.4 km/h to clinch the title. Shiva will take part in the 2017 World Championship in Innsbruck, Austria and will compete in the World Cup circuit in the lead up to the qualification process for the 2018 Olympic Winter Games in Korea.

102. (C) 
$$\mu = \frac{\text{lateral strain}}{\text{longitudinal strain}}$$

$$\mu = \frac{\Delta L/L}{\Delta t/t}$$

$$\mu = \frac{0.01}{1/t}$$

$$\frac{1}{t} = \frac{0.01}{\mu}$$

$$\frac{t}{1} = \frac{\mu}{0.01}$$

$$\frac{t}{1} = \frac{4}{0.01}$$

$$t = 400 \text{ mm}$$

104. (B) Knows that  
 $E = 3K(1 - 2 \times 0.25)$

$$\frac{K}{E} = \frac{2}{3}$$

105. (B) Given  $E = 125 \text{ GPa}$

$$\mu = 0.25$$

$$G = ?$$

Knows that

$$E = 2G(1 + \mu)$$

$$125 = 2G(1 + 0.25)$$

$$\frac{125}{1.25 \times 2} = G$$

$$G = 50 \text{ GPa}$$

107. (C) 
$$\frac{P_1}{P_2} = \frac{P_{steel}}{P_{Al}} = \frac{E_{steel}}{E_{Al}} = \frac{3}{1}$$

$$P_1 = 3P_2, F = 12000 \text{ N}$$

$$F = F_1 + F_2$$

$$F = P_1 A_1 + P_2 A_2 \{ \because A_1 = A_2 = 3 \times 10^{-4} \text{ m}^2 \}$$

$$12000 = 3P_2 \cdot 3 \times 10^{-4} + P_2 \times 3 \times 10^{-4}$$

$$12000 = 12 \times 10^{-4} \times P_2$$

$$P_2 = 10^7 \text{ N/m}^2 = 10 \text{ N/mm}^2$$

$$P_1 = 3P_2 = 30 \text{ N/mm}^2$$

So,  $P_{steel} = 30 \text{ N/mm}^2$

110. (D) Radius of mohr's circle (R) =  $\frac{\sigma_{max} - \sigma_{min}}{2}$

$$R = \frac{\sigma_{max} - \sigma_{min}}{2} = \frac{-1 - (-1)}{2} = 0$$

So, Radius of mohr circle will zero

111. (A) Knows that

$$\mu = \frac{\text{lateral strain}}{\text{longitudinal strain}}$$

Poisson effect says that for a particular material it is always found to be constant.  $\therefore$  For same bar under tension & compression  $\mu$  is always same.

113. (D)

$$(\sigma_n)_{max} = \left( \frac{\sigma_x + \sigma_y}{2} \right) + \left( \frac{\sigma_x - \sigma_y}{2} \right) \cos 2\theta - \tau_{xy} \sin 2\theta$$

$$(\sigma_n)_{max} = \text{Maximum normal stress}$$

$$\tau_{xy} = \text{Shear Stress}$$

$$\sigma_x = \sigma_y = p \text{ and } \theta = 45^\circ$$

$$\sigma_x = p, \sigma_y = -p$$

$$(\sigma_n)_{max} = \left( \frac{p - p}{2} \right) + \left( \frac{p + p}{2} \right) \cos 90^\circ - 0$$

$$(\sigma_n)_{max} = 0$$

116. (B) moment of inertia circular rod  $I = \frac{\pi d^4}{64}$

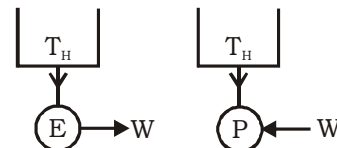
$$Y = \frac{d}{2}$$

$$\text{Section modulus } Z = \frac{I}{Y}$$

$$= \frac{\pi d^4}{64} = \frac{\pi d^3}{32}$$

$$d/2$$

139. (D)



$$\eta_E = \frac{T_H - T_L}{T_H} \quad \eta_P = \frac{T_H}{T_H - T_L}$$

$$0.3 = 1 - \frac{T_L}{T_H} \quad \eta_P = \frac{1}{1 - \frac{T_L}{T_H}}$$

$$\frac{T_L}{T_H} = 0.7 \quad \eta_P = \frac{1}{1 - 0.7} = \eta_P = 3.33$$

140. (D) Minimum freezing point of refrigerants

F-12 —  $-157^\circ\text{C}$

$\text{NH}_3$  —  $-77.8^\circ\text{C}$

$\text{CO}_2$  —  $-56.7^\circ\text{C}$

F-22 —  $-160^\circ\text{C}$

182. (C) Pascal law which states pressure intensity is same in all directions.

188. (D)  $Q = \frac{8}{15} C_d \sqrt{2g} \tan \frac{\theta}{2} H^{5/2}$

$$\propto H^{5/2} = (4)^{5/2} = \boxed{32 \text{ times}}$$

189. (A) No. of bucket (z) = 15 + 0.5 m

m = Jet ratio = D/d

$$z = 15 + 0.5 \times 18$$

$$z = 24$$

192. (C) Number of buckets

$$(Z) = 15 + \frac{D}{2d}$$

$$\text{Jet Ratio} = \frac{D}{d} = 8$$

$$Z = 15 + \frac{8}{2} = 15 + 4 = 19$$

Number of buckets (Z) = 19