Answer-key & Solution

SSC JE (Mechanical)
MOCK -(109)
Date 05.8.2017

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

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*

SOLUTION SSC JE (Mechanical) MOCK TEST no. 109

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

5. (C) ENGA**G**E

6. (A) SCATT**E**R

7. (A)

8. (B)

9. (C) $2 \to 1^2 + 1,$ $5 \to 2^2 + 1$
   $26 \to 5^2 + 1$ **677** $\to 26^2 + 1$

10. (B) $0 \to 1^3 - 1,$ $6 \to 2^3 - 2,$
   $24 \to 3^3 - 3,$ $60 \to 4^3 - 4,$
   $120 \to 5^3 - 5$ $210 \to 6^3 - 6$
   336 $\to 7^3 - 7$

11. (B)   12. (C)   13. (D)   14. (A)

15. (D)   All the rest are beasts of burden.

16. (D)   All the rest are ornaments.

17. (C)   One more letter is there.

18. (A)   ECZEMA is a skin disease. Rest are related to eye.

19. (D)   After dividing the number 59 by 8, we get 3 as remainder, where as in other cases we get 2 as remainder.

20. (D)   144 is a perfect square. Rest are perfect cubes.

21. (D)   22. (C)

23. (B)   Kanna > Malik,
   Krish > Dev
   Krish > Veena > Malik
   Dev > Veena
   Krish > Dev > Veena > Malik

24. (D)

25. (D)
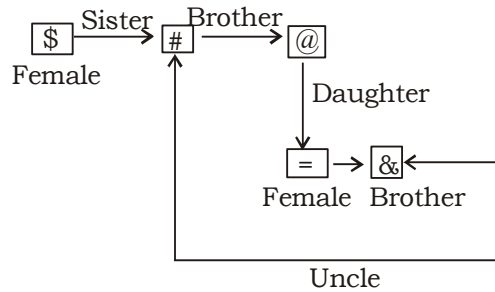
26. (B)   Eye is related to Opthalmologist. Music is related to Composer.

27. (A)   'Germany' ends in **many**. Similarly 'ireland' ends in **land**.

28. (D)

Word	Position in Alphabet
D	4
B	2
I	9
C	3
P	16
D	4
(Y)	25
(E)	5

$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$

29. (A)

1 × 2 = 2	2 × 2 = 4	3 × 2 = 6	6 × 2 = 12
A	B B	D C	F **F** **L**

30. (A) $\sqrt{01} \to 1, (\mathbf{1} + 1)^3 = 2^3 = 8$
   $\sqrt{16} \to 4, (\mathbf{4} + 1)^3 = 5^3 = \mathbf{125}$

31. (C) $B \to 2 \Rightarrow 2^4 = 16$ Similarly, $D \to 4 \Rightarrow 4^4 = 256$

32. (A)
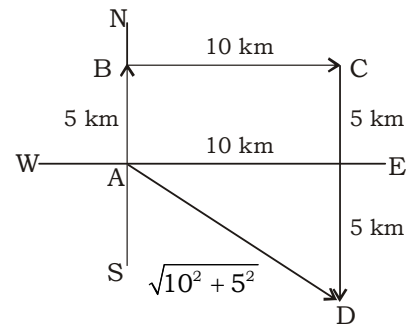
We have, AD = $\sqrt{100 + 25}$ = $\sqrt{125}$ kms.

33. (C)

| T$_{+1}$ | R | I | A | N | G | L | E |
| S | U | B | J | H | O | F | M |

| C$_{+1}$ | O | M | P | U | T | E | R |
| **P** | **D** | **Q** | **N** | **U** | **V** | **S** | **F** |

34. (C)   Original price = 100
   Reduced Price = 75
   To make it 100 again increase = 25

Increase % = $\dfrac{\text{Increase}}{\text{Original}} \times 100$
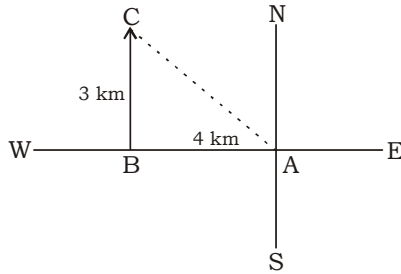
$= \dfrac{25}{75} \times 100 = \mathbf{33\dfrac{1}{3}\%}$

or,

$\dfrac{25 \times 100}{100 - 25} = \dfrac{25 \times 100}{75} = \dfrac{100}{3} = 33\dfrac{1}{3}\%$

35.(A)   36. (B)

37.(B) $6 \times 3 - 2 = \mathbf{16}$

38.(B) $15 \times 4 = 60$, $60 \times 4 = 240$
$25 \times 4 = 100$ $100 \times 4 = 400$
$30 \times 4 = \mathbf{120}$ $120 \times 4 = 480$

39.(A) $6 \times 3 = 18$, $7 \times 4 = 28$, $8 \times 5 = \mathbf{40}$

40.(B)   b b c d d d d d b c c c c d b b

41.(D)   a b c d d a b c c d a b b c d a

42.(C)

AC = $\sqrt{3^2 + 4^2}$ = 5 km

43.(A) $41 + 27 + 34 = 102 \xrightarrow{\text{reverse}} 201$

$19 + 63 + 48 = 130 \xrightarrow{\text{reverse}} 031$

$51 + 35 + 36 = 149 \xrightarrow{\text{reverse}} \mathbf{941}$

44.(A)   45. (C)   46. (C)   47. (B)

48.(C) $6 + 4 \times 5 \div 2 - 1$

$= 6 + 4 \times \dfrac{5}{2} - 1$ $= 6 + 10 - 1 = 15$

49.(B)   M → Y
O → O
D → U
E → N
R → G   M   E   T   H   O   D
N → S   ↓   ↓   ↓   ↓   ↓   ↓
         Y   N   B   A   O   U

Letters used in ORTHODOXY other than MODERN $\begin{cases} \text{T} \to \text{B} \\ \text{H} \to \text{A} \\ \text{X} \to \text{M} \\ \text{Y} \to \text{L} \end{cases}$

50.(C)

51. (A) Under Article 360, the President of India can proclaim Financial Emergency if he is satisfied that the financial stability or the credit of India or of any part of its territory is threatened. It remains in force for the period of two months and can continue to stay beyond two months. The proclamation has to be approved by both the Houses of Parliament. The National Emergency and Financial Emergency have no time limit. They can continue to be extended without any limit. But State-Emergency has a time-limit. It cannot go beyond three years. Till now Financial Emergency has never been declared by the President of India.

52. (D) The Drafting Committee for framing the constitution was appointed on 29 August 1947. The committee comprised of a chairman and six other members. In addition a constitutional advisor was also appointed. The committee members were- Dr. B. R. Ambedkar- Chairman, K.M. Munshi, Alladi Krishnaswamy Iyer, N Gopalaswami Ayengar, B.L. Mitter, Md. Saadullah and D.P Khaitan.

53. (C) Vinegar is a solution of water and Acetic Acid. It is produced from different fruits that contain sugar through the process of fermentation. There are different types of Vinegar like wine, cider, apples and rice Vinegar.

54. (D) Acid rain is caused by a chemical reaction that begins when compounds like Sulphur dioxide and nitrogen oxides are released into the air. These substances rise into the atmosphere, where they mix and react with water, Oxygen and other chemicals to form more acidic pollutants.

55. (C) Chittagong Armoury raid was done on 18th April 1930 to raid the armoury of Police and auxiliary forces from the Chittagong armoury in Bengal province of British. This raid was led by Surya Sen also known as Master-da. Chittagong is now in Bangladesh.

59. (B) First Administrative Reform Commission was established on 5th January 1996 and chaired by Morarji Desai and later by K. Hanumanthaiah. The ARC recommended the establishment of the Institutions of Lokpal and Lokayukta. It has jurisdiction over all Members of Parliament and Central Government employees in cases of corruption. It was formed in 2013. Movement was led by Anna Hazare and has counterpart in all the states of India called Lokayuktas.

60. (A) Jacobson's organ is also known as Vomeronasal organ. It is an organ of chemoreception i.e the part of the olfactory system of amphibians, reptiles

and mammals but it does not occur in all tetrapod groups. Jacobson's organ ducts connect the organ directly to the nasal cavity in lizards and snakes and helps them in smelling and in communication.

61. (B) Consequences of inflationary price rise are Income redistribution, falling real income, Negative real interest rates, cost of borrowing, Risk of wage inflation, Business competitiveness and Business uncertainity. So Answer will be Increase in economic in equalities.

63. (C) Metalloid is a chemical element with properties in between or a mixture of those of metals and non-metals. Six recognized metalloids are Boron, Silicon, Germanium, Arsenic, Antimony and Tellurium.

66. (D) Laterite soils are aluminous rock, formed by the decomposition because they are found in black soil region with heavy rainfall. This soil is found in the Eastern Ghat of Orissa, the Southern parts of Western Ghat, Malabar Coastal plains and Ratnagiri of Maharashtra, and also some parts of Andhra Pradesh, Tamil Nadu, Karnataka, Meghalaya and Western part of West Bengal.

67. (D) Cloudburst is a sudden downpour within a radius of few kilometres. It does not last longer but is capable of flooding the area.

68. (A) Three language formula is a formula of language learning formulated by the Union Education Ministry of the Government of India in consultation with the states. This formula was formulated in response to demands from non-Hindi speaking states such as Karnataka, Andhra Pradesh and Tamil Nadu.
Kothari Commission was set up in 1964 under the chairmanship of Dr. D.S. Kothari and this commission proposed three language formula.

69. (B) Analogous structures are superficially similar but anatomically dissimilar doing similar functions i.e animals belonging to different groups live in the same habitat like wings of birds and insects are examples of Analogous structure.

71. (A) The national income of a country can be measured by three alternative methods (i) Product Method (ii) Income Method and (iii) Expenditure Method.

72. (C) Seaweeds contain Iodine compound and obtain Iodine by extracting iodide ions from the seawater.

73. (B) The Ryotwari system is the system to collect revenues from the cultivators of agricultural land. The land revenue was imposed directly on the ryots (are the individual cultivators who actually worked on the land). In Bombay, Madras, Assam and Burma the Zamindars usually did not have a position as a middleman between the government and the farmer. It was introduced by Sir Thomas Munro, appointed as Governor of Madras in May 1820.

75. (B) Water Gas is a synthesis gas containing Carbon monoxide and Hydrogen $[CO+H_2]$.

77. (A) The PURA Scheme was advocated by A.P.J Kalam former President of India. In this scheme urban amenities are provided in rural areas. PURA is set to get a push, with pilot schemes planned under the public-private partnership mode. This social inclusion programme aims at providing amenities like drinking water, street lights, education, health care and telecom services to the country's rural areas and ensure that 626,000 villages become the part of development process.

78. (D) Regressive tax is a tax that takes a larger percentage from low income people than from high-income people.This tax is applied uniformly i.e. it hits lower income individuals.

83. (C) A convex mirror is also known as diverging mirror. It is a curved mirror in which the reflective surface bulges towards the light source i.e. it reflect light outwards. Such mirrors always forms a virtual image. In vehicles convex mirror is used because it helps the driver to view objects as they appear closer.

84. (C) Carotene are unsaturated hydrocarbon substances which are synthesized by plants and are photosynthetic pigments that helps in photosynthesis. Carotenes are responsible for the orange colour of the carrot.

88. (D) RAM is Random Access Memory-It is a type of computer memory that can be accessed randomly i.e any byte of memory can be accessed without touching the preceding bytes. It is the most common type of memory found in computers and other devices like printers. There are 2 types of RAM – DRAM (Dynamic RAM) and SRAM (Static RAM)

90. (D) Malawath Purna on 25th May 2015 scaled the highest peak of Mount Everest at 13 years and 11 month of age. She became the youngest girl to have reached the summit of Mt. Everest. She was born in

Pakala village, Nizamabad district of Telangana State of India.

95. **(D)** Insectivorous plants generally grow in Nitrogen deficient soils, So to obtain Nitrogen they are attracted towards insects. E.g Venus fly traps.

98. **(A)** Constant returns to scale is an attribute of a production function which exhibits of changing all inputs by a positive proportional factor and has an effect of increasing the outputs of that factor. This is true when production function has constant returns over that range. OR we can say that when the output of the process increases or decreases simultaneously or in step wise with an increase or decrease in the inputs.
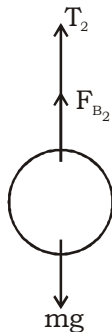
114. In Air
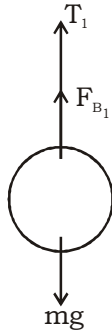
$$T_1 = mg - F_{B_1}$$

$$T_1 = \rho_b Vg - \rho_a Vg$$

$$3 = (\rho_b - \rho_a)Vg \qquad .....(i)$$

In Water

$$T_2 = mg - F_{B_2}$$

$$T_2 = \rho_b Vg - \rho_w Vg$$

$$2.5 = (\rho_b - \rho_w)Vg \qquad .....(ii)$$

equation (i) ÷ equation (ii)

$$\frac{3}{2.5} = \frac{(\rho_b - \rho_a)}{(\rho_b - \rho_w)}$$

$$3\rho_b - 3\rho_w = 2.5\rho_b - 2.5\rho_a$$

$$0.5\,\rho_b = 3\rho_w - 2.5\,\rho_a$$

dividing by ρ_w in both side

$$0.5 S_b = 3 - 2.5\ S_a$$

Spacific gravity of air is so small, so we can neglect it.

$$0.5 S_b = 3$$

$$\boxed{S_b = 6}$$

123. $\dfrac{U}{U_\infty} = \dfrac{y}{\delta}$

$$\delta^* = \int_0^\delta \left(1 - \frac{U}{U_\infty}\right).dy$$

$$= \int_0^\delta \left(1 - \frac{y}{\delta}\right).dy$$

$$= \left(y - \frac{y^2}{2\delta}\right)_0^\delta$$

$$= \delta - \frac{\delta}{2}$$

$$\boxed{\delta^* = \frac{\delta}{2}}$$

124. Shear stress in a pipe flow-

$$\tau \propto r$$

$$\frac{\tau_2}{\tau_1} = \frac{r_2}{r_1}$$

$$\tau_2 = 0.1 \times \frac{6}{2} = 0.3$$

$$\boxed{\tau_2 = 0.3\,Pa}$$

131. $P = (-3V + 15) \times 10^5 N/m^2$

$V_1 = 1m^2$ to $V^2 = 2m^3$

$$w = \int_{V_1}^{V_2} P.dv = \int_1^2 (-3V + 15) \times 10^5 dv$$

$$w = \left[-\frac{3}{2}\left[V^2\right]_1^2 + 15\left[V\right]_1^2\right] \times 10^5$$

$$= \left[-\frac{3}{2} \times 3 + 15(2-1)\right] \times 10^5$$

$$= \left(-\frac{9}{2} + 15\right) \times 10^5$$

$$w = \frac{21}{2} \times 10^5 J$$

$w = 10.5 \times 10^5 \, J$

$\boxed{w \simeq 10 \times 10^5 \, J}$

136. Two engines are in series producing equal work. For this condition intermediate temperature T_2 is given as

$T_2 = \dfrac{T_1 + T_2}{2}$
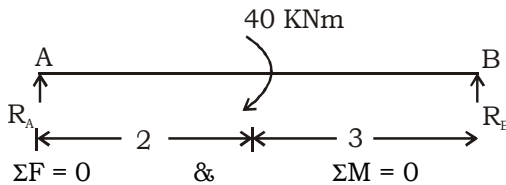
$= \dfrac{900 + 400}{2}$

$\boxed{T_2 = 650 \, K}$

139. Two engines are in series having same efficiency, for this condition intermediate temperature T_2 is given as-

$T_2 = \sqrt{T_1 \cdot T_3}$

$= \sqrt{900 \cdot 400}$

$\boxed{T_2 = 600 \, K}$

156.

40 KNm

$\Sigma F = 0$ & $\Sigma M = 0$

$F_x = 0$

$F_y = R_A + R_B = 0$ ......(i)

taking moment about 'A'

$\Sigma M_A = 0$

$R_B \cdot 5 - 40 = 0$

$\boxed{R_B = 8 \, kN}$

from equation (i)

$\boxed{R_A = -8 \, kN}$

161. For circular cross section of beam

$I = \dfrac{\pi}{64} d^4$ & $y_{max} = \dfrac{d}{2}$

$Z = \dfrac{I}{y_{max}} = \dfrac{\pi}{64} \cdot d^4 \cdot \dfrac{2}{d}$

$\boxed{Z = \dfrac{\pi . d^3}{32}}$

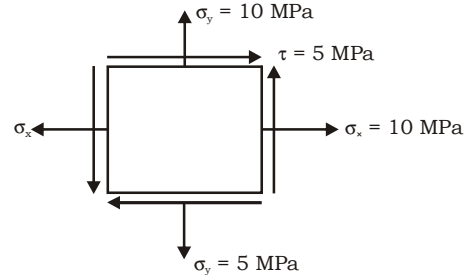164. Consider a cylinder of dia 'D' and length 'L'

$V = \dfrac{\pi}{4} D^2 L$

$dV = \dfrac{\pi}{4} \left[2DL \, dD + D^2 dL \right]$

$\dfrac{dV}{V} = \dfrac{\dfrac{\pi}{4} \left[2DL \, dD + D^2 dL \right]}{\dfrac{\pi}{4} D^2 L}$

$= 2 \left(\dfrac{dD}{D} \right) + \left(\dfrac{dL}{L} \right)$

$\boxed{e_v = 2e_h + e_L}$

165.

$\sigma_{1,2} = \left(\dfrac{\sigma_x + \sigma_y}{2} \right) \pm \sqrt{\left(\dfrac{\sigma_x - \sigma_y}{2} \right)^2 + \tau^2}$

$= \left(\dfrac{10 + 10}{2} \right) \pm \sqrt{\left(\dfrac{10 - 10}{2} \right)^2 + 5^2}$

$= 10 \pm 5$

$\boxed{\sigma_1 = 15 \, MPa}$, $\boxed{\sigma_2 = 5 \, MPa}$

187. $t_s = k \left(\dfrac{V}{S.A} \right)^2$

$\dfrac{(t_s)_{sphere}}{(t_s)_{cube}} = \left[\left(\dfrac{V}{S.A} \right)_{sphere} \cdot \left(\dfrac{S.A}{V} \right)_{cube} \right]^2$

$= \left[\dfrac{V_{sphere}}{V_{cube}} \cdot \dfrac{(S.A)_{cube}}{(S.A)_{cube}} \right]^2$

$= (2)^2$

$(t_s)_{sphere} = 4(t_s)_{cube}$

$\boxed{(t_s)_{sphere} = 8 \, min}$

188. $\tan \phi = \dfrac{r \cos \alpha}{1 - r \sin \alpha}$

$\alpha = 30°$

$r = 0.5$

$\tan \phi = \dfrac{0.5 \cos 30°}{1 - 0.5 \sin 30°} = \dfrac{\dfrac{1}{2} \cdot \dfrac{\sqrt{3}}{2}}{1 - \dfrac{1}{2} \cdot \dfrac{1}{2}}$

$= \dfrac{\sqrt{3}/4}{3/4}$

$\boxed{\tan \phi = \dfrac{1}{\sqrt{3}}}$