

**SSC-JE : MECHANICAL ENGINEERING** 

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# **SSC - JE 2015**

## **Mechanical Engineering**

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Objective Paper : Questions & Solutions

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**ECT PUBLICATIONS**



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## SSC Jr. Engineer-2015 PAPER ANALYSIS

### Mechanical

#### SUBJECT-WISE PAPER ANALYSIS

Subject	Total No. of Questions
Theroy of Machine and Machine Design	16
Engineering Mechanics and Strength of Materials	14
Thermodynamics (Thermal Engineering, 1st Law, 2nd Law)	10
Thermodynamics Application (Air Cycle, IC Engines, RAC, Boilers and Turbines)	20
Fluid Mechaines and Machinery (Kinematics, Dynamics, Flow Rate, Hydraulics and Pumps )	30
Production Engginerring (Classification of Steels)	10
<b>Total</b>	<b>100</b>

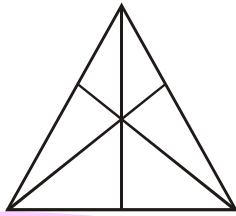
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**GENERAL INTELLIGENCE & REASONING**

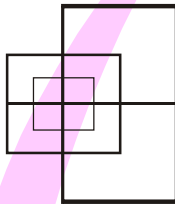
1. How many triangles are there in the figure?



- (a) 7 (b) 10  
(c) 16 (d) 20

**Ans.(c)**

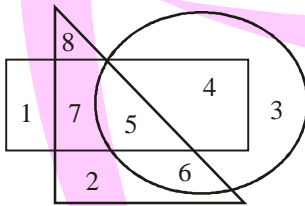
2. Find the number of minimum straight lines required to make figure



- (a) 13 (b) 17  
(c) 15 (d) 19

**Ans.(a)**

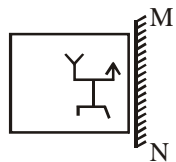
3. Write the number of space enclosed by rectangle and circle but not by triangle



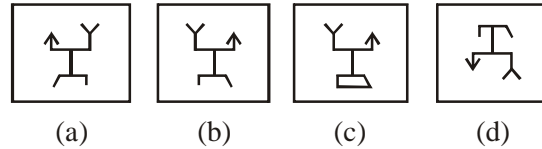
- (a) 3 (b) 2  
(c) 1 (d) 4

**Ans.(d)**

4. If a mirror is placed on the line MN, then which of the answer figures is the right image of the given figure?



**Answer figures**



**Ans.(a)**

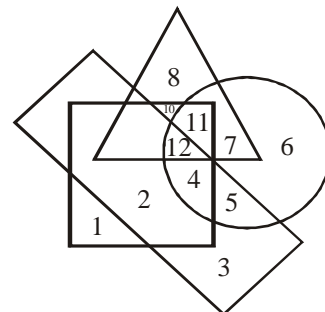
5. A word is represented by only one set of numbers as given in any one of the alternatives. The sets of numbers given in the alternatives are represented by two classes of alphabets as in two matrices given below. The columns and rows of Matrix I are numbered from 0 to 4 and that of Matrix II are numbered from 5 to 9. A letter from these matrices can be represented first by its row and next by its column, e.g. 'M' can be represented by 01, 14 etc., and 'S' can be represented by 58, 77 etc. Similarly, you have to identify the set the word 'ROHAN'.

Matrix I						Matrix II					
	0	1	2	3	4		5	6	7	8	9
0	H	M	X	W	K	5	A	D	E	S	B
1	N	R	N	Y	M	6	T	U	O	G	Q
2	K	V	H	P	W	7	O	Q	S	D	A
3	Y	Z	R	M	N	8	S	E	U	E	D
4	W	V	H	J	P	9	Q	B	A	T	O

- (a) 11, 57, 00, 55, 12 (b) 11, 75, 00, 55, 10  
(c) 32, 75, 21, 55, 10 (d) 32, 67, 41, 55, 12

**Ans.(b)**

6. In the given figure, the circle stands for intelligent, square for hardworking, triangle for Post graduate and the rectangle for loyal employees. Study the figure and answer the following questions.



Employees who are intelligent, hardworking and loyal but not Post graduate are represented by

- (a) 11 (b) 5  
(c) 4 (d) 3

**Ans.(c)**

**Directions :** In questions nos. 7 and 8, one/two statement(s) are given are followed by two conclusion/assumption, I and II. You have to consider the statements to be true even if they seem to be at variance from commonly known facts. You have to decide which of the given conclusion/assumptions, if any, follows from the given statements.

7. **Statements :** All students are girls.

Some students are not talented.

**Conclusions :** I. No students is talented

II. Some girls are talented

- (a) Only I follows
- (b) Only II follows
- (c) Both I and II follows
- (d) Neither I nor II follows

**Ans.(d)**

8. **Statements :** 1. Tigers do not fly  
2. Hens do not fly.

**Conclusions :** I. Tigers are birds

II. All birds cannot fly

- (a) Only I follows
- (b) Only II follows
- (c) Both I and II follows
- (d) Neither I nor II follows

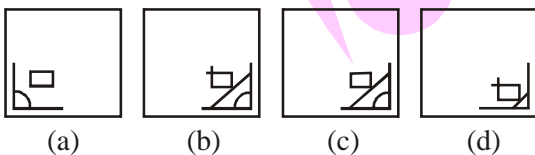
**Ans.(d)**

9. Which answer figure will complete the pattern in the question figure?

**Question figure**



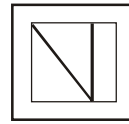
**Answer figure**



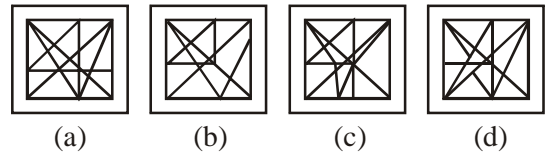
**Ans.(b)**

10. From the given answer figures, select the one in which the question figure is hidden/embedded.

**Question figure**



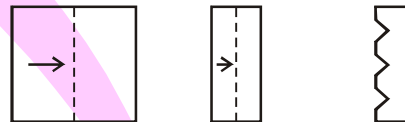
**Answer figure**



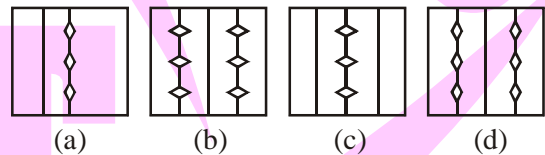
**Ans.(a)**

11. A piece of paper is folded and cut as shown below in the question figures. From the given answer figures, indicate how it will appear when opened.

**Question figures**



**Answer figures**



**Ans.(b)**

12. Ramu's mother has three sons. The eldest one is called onekari, the second one is called twokari. Then the third son's name is

- (a) Teenkari
- (b) Sandu
- (c) Ramu
- (d) Nokari

**Ans.(c)**

13. Ashok is heavier than Gopal. Mahesh is lighter than Jayesh. Prashant is heavier than Jayesh but lighter than Gopal. Who among them is heaviest?

- (a) Gopal
- (b) Ashok
- (c) Prashant
- (d) mahesh

**Ans.(a)**

14. From the given alternative words, select the word which cannot be formed using the letters of the given word :

KILOMETERS

- (a) OIL
- (b) MEET
- (c) TREES
- (d) STREET

**Ans.(d)**

15. In a certain code language, if the word 'RHOMBUS' is coded as TJQODWU, then how is the word 'RECTANGLE' in that language ?

- (a) TGEVCPIMG (b) TGEVCPING  
(c) TGEWDPING (d) TGFWEPIING

Ans.(b)

16. If in a certain code 'Education' is written as 3 6 5 7 9 8 2 1 4 then how 'Conduct' can be written?

- (a) 7 1 4 6 5 7 8 (b) 6 5 4 7 8 7 1  
(c) 1 4 5 8 7 7 6 (d) 6 4 8 5 7 6 7

Ans.(a)

17. If  $7x = 8k$  and  $5y = 6k$  then the value of ratio  $x$  is to  $y$  is

- (a) 20 : 21 (b) 21 : 20  
(c) 35 : 48 (d) 48 : 35

Ans.(a)

18. If  $44 + 12 = 30$ ,  $77 + 14 = 61$ ,  $84 + 16 = 66$  then what should be for  $44 + 22 = ?$

- (a) 28 (b) 20  
(c) 32 (d) 24

Ans.(b)

19. Select the set of symbols which can be fitted correctly in the equation,

$$8 \quad 4 \quad 2 \quad 6 \quad 3 = 32$$

- (a)  $\times, -, +, \div$  (b)  $+, \times, \div, -$   
(c)  $+, \div, \times, -$  (d)  $-, \times, \div, +$

Ans.(a)

Directions : In question nos. 20 to 22, which one of the given responses would be a meaningful order of the following?

20. 1. Village 2. State  
3. Nation 4. District  
(a) 1, 2, 4, 3 (b) 1, 4, 2, 3  
(c) 2, 3, 1, 4 (d) 4, 2, 3, 1

Ans.(b)

21. 1. Branches 2. Root  
3. Trunk 4. Leaf  
5. Flower  
(a) 4, 1, 3, 2, 5 (b) 2, 3, 1, 4, 5  
(c) 1, 2, 3, 4, 5 (d) 4, 3, 1, 2, 5

Ans.(b)

22. 1. Adulthood 2. Babyhood  
3. Childhood 4. Infancy  
(a) 4, 3, 2, 1 (b) 4, 2, 3, 1  
(c) 4, 1, 2, 3 (d) 4, 3, 1, 2

Ans.(b)

Directions : In question nos. 23 to 28, a series is given with one term missing. Choose the correct alternative from the given ones that will complete the series.

23. CDDP DEER EFFT FGGV GHXX ?  
(a) ZIIH (b) HIIZ  
(c) HJJY (d) HIJZ

Ans.(b)

24. l m n m n o p n o p q r ?  
(a) pqrst (b) lmnop  
(c) opqrs (d) hpqrs

Ans.(c)

25. R I A T N I E ?  
(a) A (b) B  
(c) C (d) D

Ans.(b)

26.  $(\frac{1}{8}), (\frac{1}{4}), (\frac{1}{2}), 1, ?, 4$   
(a)  $(\frac{3}{8})$  (b)  $(\frac{2}{8})$   
(c) 2 (d) 6

Ans.(c)

27. 11, 12, 16, 25, ?  
(a) 45 (b) 41  
(c) 43 (d) 49

Ans.(b)

28. 3, 9, 21, 45, ?  
(a) 54 (b) 78  
(c) 87 (d) 93

Ans.(d)

Directions : In question nos. 29 and 30, select the missing number from the given responses.

13	15	12
02	04	05
04	05	08
30	65	?

- (a) 64 (b) 69  
(c) 65 (d) 68

**Ans.(d)**

20	30	12
3	4	8
80	?	116

- (a) 120 (b) 60  
(c) 100 (d) 140

**Ans.(d)**

- 31.** Hospital is 12 km towards east of Rupin's house. His school is 5 km towards south of Hospital. What is the shortest distance between Rupin's house and school?

- (a) 16 km (b) 17 km  
(c) 12 km (d) 13 km

**Ans.(d)**

- 32.** Two cars started from a particular spot. The car A ran Straight at the speed of 30 kmph for 2 hours north and then took a right turn. It run 40 km and again turned right. It stopped after east at the speed of 20 kmph for 2 hours and turned left. it ran for 100 km and then stopped. How far were there two cars from each other when both of them stopped at last ?

- (a) 17 km (b) 18 km  
(c) 19 km (d) 20 km

**Ans.(d)**

**Direction :** In question nos. 33 to 41, select the related word/ letters/number from the given alternatives.

- 33.** CHAIR : FURNITURE :: FORK : ?

- (a) SPOON (b) CUTLERY  
(c) CROCKERY (d) FOOD

**Ans.(b)**

- 34.** Compass : Ship :: Vastu : ?

- (a) Building (b) Flat  
(c) Home (d) Land

**Ans.(c)**

- 35.** BOOK : LIBRARY :: ? : FILE

- (a) COMPUTER (b) DATA  
(c) FOLDER (d) BYTES

**Ans.(b)**

- 36.** q : d :: b : ?

- (a) p (b) d  
(c) q (d) b

**Ans.(a)**

- 37.** ABB : EGJ :: FHL : ?

- (a) BDH (b) JMT  
(c) FHH (d) JIL

**Ans.(b)**

- 38.** EV : KP :: TG : ?

- (a) ZA (b) AZ  
(c) ZZ (d) AA

**Ans.(a)**

- 39.** 21 : 65 :: 31 : ?

- (a) 78 (b) 80  
(c) 85 (d) 95

**Ans.(d)**

- 40.** 17 : 102 :: 23 : ?

- (a) 112 (b) 138  
(c) 216 (d) 413

**Ans.(b)**

- 41.** 25 : 36 :: ?

- (a) 9 : 25 (b) 16 : 25  
(c) 25 : 49 (d) 81 : 121

**Ans.(b)**

**Directions :** In question nos 42 to 49, find the odd word/number pair from the given alternatives.

- 42.** (a) stare (b) glance  
(c) look (d) hug

**Ans.(d)**

- 43.** (a) Analogy (b) Reasoning  
(c) Decoding (d) Cycling

**Ans.(d)**

44. (a) Nephrology (b) Astrology  
(c) Pathology (d) Entomology

**Ans.(b)**

45. (a) accdff (b) prrsu  
(c) mnnoqq (d) egghij

**Ans.(c)**

46. (a) OQTX (b) JMNQ  
(c) EGJN (d) XZCG

**Ans.(b)**

47. (a) NMOK (b) PKQJ  
(c) RLSK (d) TGUF

**Ans.(a)**

48. (a) 997 (b) 976  
(c) 778 (d) 895

**Ans.(a)**

49. (a) 8 (b) 87  
(c) 111 (d) 96

**Ans.(a)**

50. Pick the odd number from the sequence below :

2, 3, 6, 7, 11, 15, 30

- (a) 7 (b) 11  
(c) 6 (d) 30

**Ans.(b)**

**GENERAL AWARENESS**

51. The storage form of glucose is

- (a) Insulin (b) Glycogen  
(c) Glucagon (d) Fructose

**Ans.(b)**

52. Thigmotropism is the response of the plant to

- (a) Gravity (b) Water  
(c) Light (d) Contact

**Ans.(d)**

53. Root hairs are produced from

- (a) trichotnes (b) trichiblast  
(c) rhizodermis (d) epidermis

**Ans.(c)**

54. Second Ozone hole was detected over

- (a) Antartica (b) Artica  
(c) Sweden (d) Northern hemisphere

**Ans.(a)**

55. Glycolysis during fermentation results in not gain of

- (a) 1 ATP (b) 2 ATPs  
(c) 3 ATPs (d) 4 ATPs

**Ans.(b)**

56. The disadvantage of self-pollination is

- (a) seeds are less in number  
(b) no dependence of pollinating agents  
(c) mechanism is too simple  
(d) no wastage of pollengrains

**Ans.(a)**

57. By increasing the intensity of incident light on the surface, the photo electric current

- (a) increases  
(b) decreases  
(c) unchanged  
(d) increases initially and then decreases

**Ans.(d)**

58. The Phenomenon of light splitting into seven distinct colours when it passes through prism is

- (a) diffraction (b) polarisation  
(c) dispersion (d) reflection

**Ans.(c)**

59. A block placed on an inclined plane of slope angle  $\theta$  slides down with a constant speed. The coefficient of kinetic friction is equal to

- (a)  $\sin \theta$  (b)  $\cos \theta$   
(c)  $\tan \theta$  (d)  $\cot \theta$

**Ans.(c)**

60. A plumb bob is hanging from the ceiling of a car. If the car moves with an acceleration  $a$ , the angle made by the string with the vertical is

- (a)  $\sin^{-1}\left(\frac{a}{g}\right)$  (b)  $\sin^{-1}\left(\frac{g}{a}\right)$   
(c)  $\tan^{-1}\left(\frac{a}{g}\right)$  (d)  $\tan^{-1}\left(\frac{g}{a}\right)$

**Ans.(c)**

61. Who is called the 'Father of Indian Cinema'?

- (a) Raj Kapoor (b) Dilip kumar  
(c) Mehboob Khan (d) Dada Saheb Phalke

**Ans.(d)**

62. Name the first Indian woman to climb Mount Everest

- (a) Santosh Yadav (b) Backhendri Pal  
(c) Rita Farai (d) Leela Seth

**Ans.(b)**

63. Which IPL Team won the eighth edition of the Indian Premier League?

- (a) Mumbai Indians (b) Chennai Super Kings  
(c) Delhi Daredevils (d) Kolkata Knight Riders

**Ans.(a)**

64. Nehru Trophy is associated with which sport in India?

- (a) Football (b) Cricket  
(c) Hockey (d) None of the above

**Ans.(c)**

65. Aung San Suu Kyi, a prodemocracy compaigner, is from which of the following countries?

- (a) Nepal (b) Myanmar  
(c) Bangladesh (d) China

**Ans.(b)**



66. Usain Bolt is famous as

- (a) an astronaut (b) a boxer  
(c) an athlete (d) a cricketer

Ans.(c)

67. Which of the following is the morning 'Ragg' in music ?

- (a) Sohini (b) Bhairavi  
(c) Sarang (d) Malhaar

Ans.(b)

68. When was the first All India Postage Stamp issued?

- (a) 1854 (b) 1858  
(c) 1850 (d) 1856

Ans.(a)

69. In which country was paper currency first used?

- (a) India (b) Egypt  
(c) China (d) Japan

Ans.(c)

70. The murder of Archduke Ferdinand and his wife triggered off which of the following events?

- (a) Crimean War (b) Balkan War  
(c) First World War (d) Second World War

Ans.(b)

71. .com represents ?

- (a) communication domain (b) Educational domain  
(c) Commercial domain (d) Government domain

Ans.(a)

72. IKE stands for

- (a) Internet Key Exchange  
(b) Information Key Execution  
(c) Information Key Exchange  
(d) Infrastructure Key Encryption

Ans.(a)

73. When salt is added to water, the boiling point of water is

- (a) Lowered (b) Unaffected  
(c) Increased (d) Constant

Ans.(c)

74. The gas dissolved in water that makes it acidic

- (a) hydrogen (b) nitrogen  
(c) carbon dioxide (d) ammonia

Ans.(c)

75. The hydrogen ion concentration of a solution is measured using a

- (a) thermometer (b) pH meter  
(c) hydrometer (d) barometer

Ans.(b)

76. Non-bonding valence electrons are

- (a) Involved only in covalent bond formation  
(b) Involved only in ionic bond formation  
(c) Involved in both ionic and covalent bond formation  
(d) Not involved in covalent bond formation

Ans.(c)

77. When is the World Earth Day celebrated?

- (a) 4 April (b) 22 April  
(c) 1 May (d) 23 March

Ans.(b)

78. World "No Tobacco Day" was observed globally on

- (a) 31 May (b) 2 June  
(c) 15 June (d) 20 June

Ans.(a)

79. The greenhouse gases, otherwise called radioactively active gases include

- (a) Carbon dioxide (b) CH<sub>4</sub>  
(c) N<sub>2</sub>O (d) All of these

Ans.(d)

80. The most serious environmental effect posed by hazardous wastes is

- (a) air pollution  
(b) contamination of ground water  
(c) increased use of land of landfills  
(d) None of the above

Ans.(b)

81. Which Delhi Sultan resorted to price control and rationing?

- (a) Balban  
(b) Muhammad-bin-Tughluq  
(c) Bahlul Lodi  
(d) Alaud-din-Khilji

Ans.(d)

**82.** The Maratha ruler Shivaji ruled his kingdom with the help of a Council of Ministers called

- (a) Ashtapradan (b) Ashtadigajas  
(c) Navarathnas (d) Mantriparishad

**Ans.(a)**

**83.** Ms. Florence Nightingale was associated with

- (a) Seven years War (b) Thirty Years War  
(c) Crimean War (d) Hundred Years War

**Ans.(c)**

**84.** Who among the following Gupta emperor was known as 'Vikramaditya'?

- (a) Samudra Gupta (b) Kumar Gupta  
(c) Chandra Gupta I (d) Chandra Gupta II

**Ans.(d)**

**85.** The finely painted cotton fabric made in Golkanda was called

- (a) Calico (b) Muslin  
(c) Kalamkari (d) Palampore

**Ans.(c)**

**86.** Which of the best type of cotton grown in the world?

- (a) Long staple (b) Medium staple  
(c) Short staple (d) Thick staple

**Ans.(a)**

**87.** Which one of the following is first multipurpose project constructed in India?

- (a) Rihand (b) Thungabadra  
(c) Farraka Barrage (d) Damodar

**Ans.(d)**

**88.** What is the symbol of (WWF) World Wildlife Fund?

- (a) Red Panda (b) Rhododendron  
(c) Bear (d) White Tiger

**Ans.(a)**

**89.** Market Gardening comes in this category

- (a) Horticulture (b) Monoculture  
(c) Subsistence farming (d) Sericulture

**Ans.(a)**

**90.** A deep or french in the ocean floor is called

- (a) Ridges (b) Crest  
(c) Trough (d) Continental Shelf

**Ans.(b)**

**91.** Name the co-operative society that provides housing loan facility at reasonable rates

- (a) Credit co-operatives  
(b) Housing co-operatives  
(c) Consumer co-operatives  
(d) Producer's co-operatives

**Ans.(b)**

**92.** Name the biggest employer in India

- (a) Steel Authority of India Ltd (SAIL)  
(b) Post & Telecom Department  
(c) Food Corporation of India (FCI)  
(d) Indian Railways

**Ans.(d)**

**93.** Which of the following is an allied activity of agriculture

- (a) Livestock (b) Small Scale Industry  
(c) Money lending (d) Insurance

**Ans.(a)**

**94.** Disguised unemployment means

- (a) Working as Self-Employed  
(b) Not working whole day  
(c) Marginal Productivity is zero  
(d) Production is less

**Ans.(c)**

**95.** Cartel is a part of

- (a) Monopoly (b) Oligopoly  
(c) Perfect competition (d) Monopolistic competition

**Ans.(b)**

**96.** In the presidential system of government, the President is

- (a) Head of the state  
(b) Head of the state and Head of the Government  
(c) Head of the Government  
(d) Head of the Executive

**Ans.(b)**

**97.** The Chief Election Commissioner of India is appointed by

- (a) Chief Justice of India (b) Prime Minister  
(c) President (d) Parliament

**Ans.(c)**

98. The Election Commission of India is

- (a) An independent body
- (b) Quasi-judicial body
- (c) Quasi-legislative body
- (d) Executive body

**Ans.(a)**

99. Articles 23 and 24 of the Indian Constitution deal with

- (a) Right against Exploitation
- (b) Right to Freedom
- (c) Right to Freedom of Religion
- (d) Right to Education

**Ans.(a)**

100. Which of the following ideologies aims at the spiritualization of politics?

- (a) Marxism
- (b) Socialism
- (c) Sarvodaya
- (d) Pularlism

**Ans.(c)**

ECT

## MECHANICAL ENGINEERING

**101.** In a homogeneous, isotropic elastic material, the modulus of elasticity  $E$  in terms of  $G$  and  $K$  is equal to

- (a)  $\frac{9KG}{G+3K}$  (b)  $\frac{9KG}{3G+K}$   
 (c)  $\frac{3K+G}{3G+K}$  (d)  $\frac{6KG}{K+3G}$

**Ans.(a)**

**102.** In a composite bar the resultant strain produced will be

- (a) sum of the strain produced by the individual bars  
 (b) same as the strain produced in each bar  
 (c) difference of strain produced by the individual bars  
 (d) same as the stress produced in each bars

**Ans.(b)**

**103.** Two springs of stiffness  $k_1$  and  $k_2$  respectively are connected in series, what will be the stiffness of the composite spring?

- (a)  $k = \frac{k_1 k_2}{k_1 + k_2}$  (b)  $k = \frac{k_1 + k_2}{k_1 k_2}$   
 (c)  $k = k_1 + k_2$  (d)  $k = k_1 k_2$

**Ans.(a)**

**104.** A solid shaft transmits 44 kW power at 700 rps. Calculate the torque produced

- (a) 10 Nm (b) 100 Nm  
 (c) 600 Nm (d) 60 Nm

**Ans.(a)**

**105.** What are the equilibrium conditions to be satisfied for a particle applied with a system of non-coplanar concurrent forces?

- (a)  $\Sigma F_x = 0$  and  $\Sigma F_y = 0$   
 (b)  $\Sigma F_x = 0$ ,  $\Sigma F_y = 0$  and  $\Sigma M_{z\text{-axis}} = 0$   
 (c)  $\Sigma F_x = 0$ ,  $\Sigma F_y = 0$  and  $\Sigma F_z = 0$   
 (d)  $\Sigma F_x = 0$ ,  $\Sigma F_y = 0$ ,  $\Sigma F_z = 0$ ,  
 $\Sigma M_x = 0$ ,  $\Sigma M_y = 0$  and  $\Sigma M_z = 0$

**Ans.(d)**

**106.** As per first law of thermodynamics, when any system confined within a boundary is carried through a series of operations such that the final state is same as the initial state, then

- (a) the net work transfer is higher than the net heat transfer  
 (b) the network transfer is lower than the net heat transfer  
 (c) the network transfer is equal to the net heat transfer  
 (d) the network transfer is equal to or higher than the net heat transfer

**Ans.(c)**

**107.** Enthalpy is calculated as the

- (a) sum of internal energy and the product of pressure and volume of the system  
 (b) sum of internal energy and the product of pressure and density of the system  
 (c) difference between the internal energy and the product of pressure and density of the system  
 (d) difference between the internal energy and the product of pressure and volume of the system

**Ans.(a)**

**108.** The area below the  $p$ - $V$  diagram of a non-flow process represents

- (a) heat transfer (b) mass transfer  
 (c) work transfer (d) entropy transfer

**Ans.(c)**

**109.** A heat engine is a device that operates on a thermodynamics cycle

- (a) to convert the heat supplied into complete work energy under reversible conditions  
 (b) to convert the heat supplied into complete work energy under all conditions  
 (c) to produce useful work from the heat received from a source and also rejects the remaining heat to the sink under all conditions  
 (d) to produce useful work from the heat received from a source and also rejects the remaining heat to the sink under reversible conditions

**Ans.(c)**

**110.** Sub-cooling in a vapour compression cycle

- (a) decreases the required work and refrigeration effect  
 (b) increase the required work and refrigeration effect

- (c) increases the required work and decrease the refrigeration effect  
 (d) does not affect the required work and increases the refrigeration effect

**Ans.(d)**

**111.** An ideal flow of any fluid must fulfil the following

- (a) Boundary layer theory  
 (b) Continuity equation  
 (c) Newton's law of viscosity  
 (d) Pascal's law

**Ans.(b)**

**112.** If  $w$  is the specific weight of the liquid and  $h$  the depth of any point from the surface, then the pressure intensity at that point will be

- (a)  $h$  (b)  $wh$   
 (c)  $w/h$  (d)  $h/w$

**Ans.(b)**

**113.** The stress-strain relation of the newtonian fluid is

- (a) Hyperbolic (b) Inverse type  
 (c) Linear (d) Parabolic

**Ans.(c)**

**114.** When a vertical wall is subjected to pressure due to liquid on both sides, the resultant pressure is the \_\_\_\_\_ of the two pressures.

- (a) Sum (b) Difference  
 (c) Arithmetic (d) Geometric mean

**Ans.(a)**

**115.** A flow in which each liquid particle has a definite path, and the paths of individual particles do not cross each other is called

- (a) Steam flow (b) Uniform flow  
 (c) Streamline flow (d) Turbulent flow

**Ans.(b)**

**116.** A fluid is said to be ideal, if it is

- (a) inviscous and incompressible  
 (b) inviscous and compressible  
 (c) viscous and compressible  
 (d) viscous and incompressible

**Ans.(a)**

**117.** Netwon's law of viscosity is a relationship between

- (a) pressure, velocity and temperature  
 (b) shear stress and rate of shear strain  
 (c) shear stress and rate of shear strain  
 (d) rate of shear strrain and temperature

**Ans.(b)**

**118.** The coefficient of discharge of an orifice varies with

- (a) Reynolds number (b) Weber number  
 (c) Froude number (d) Mach number

**Ans.(a)**

**119.** In manometer a better liquid combination is one having

- (a) lower surface tension (b) higher surface tension  
 (c) high viscosity (d) low viscosity

**Ans.(a)**

**120.** A micrometer with inclined tube is called is

- (a) inverted manometer (b) differential manometer  
 (c) closed tube manometer (d) sensitive manometer

**Ans.(d)**

**121.** Hydrometer is used to determine

- (a) density of liquids  
 (b) specific gravity of the liquid  
 (c) flow of liquids  
 (d) relative humidity

**Ans.(b)**

**122.** Continuity equation for a compressible fluid is

- (a)  $A_1 V_1 = A_2 V_2$   
 (b)  $\rho_1 A_1 V_1 = \rho_2 A_2 V_2$  ( $A \rightarrow$  area)  
 (c)  $\frac{A_1 V_1}{\rho_1} = \frac{A_2 V_2}{\rho_2}$  ( $V \rightarrow$  velocity)  
 (d)  $\frac{\rho_1 A_1}{V_1} = \frac{\rho_2 A_2}{V_2}$  ( $\rho \rightarrow$  density)

**Ans.(b)**

**123.** For the same maximum temperature in the cycle, the average temperature of heat addition of a Rankine cycle compared to that of Carnot cycle is

- (a) lower (b) higher  
 (c) same (d) not related

**Ans.(b)**

- 124.** If a reheater is added to a Rankine Cycle, then usually,
- (a) the network and efficiency increase
  - (b) the network and efficiency decrease
  - (c) the network remain same and efficiency increases
  - (d) the network remain same and efficiency remains same

**Ans.(a)**

- 125.** The Babcock and Wilcox boiler is considered as a

- (a) natural convection fire tube boiler
- (b) forced convection fire tube boiler
- (c) natural convection water tube boiler
- (d) forced convection water tube boiler

**Ans.(c)**

- 126.** Boiler accessories are used to ensure

- (a) improved performance
- (b) safe operation
- (c) easy maintenance
- (d) automatic control

**Ans.(a)**

- 127.** The Benson boiler has

- (a) two drums – one for water and another for steam
- (b) a horizontal steam drum
- (c) a vertical steam drum
- (d) no steam drum

**Ans.(d)**

- 128.** For air compressor, least work input will be needed if the compression is

- (a) isentropic
- (b) isothermal
- (c) polytropic
- (d) hyperbolic

**Ans.(b)**

- 129.** Rotary compressor is best suited for

- (a) large quantity of air at high pressure
- (b) small quantity at high pressure air
- (c) small quantity at low high pressure air
- (d) large quantity of air at low pressure

**Ans.(d)**

- 130.** Steam nozzle converts

- (a) heat energy to kinetic energy
- (b) kinetic energy to heat energy
- (c) heat energy to potential energy
- (d) potential energy to heat energy

**Ans.(a)**

- 131.** The degree of reaction of a steam turbine is the ratio between the enthalpy drops in

- (a) moving blades and that in the stage
- (b) moving blades and that in the nozzle
- (c) in the nozzle and that in the moving blades
- (d) in the nozzle and that in the stage

**Ans.(a)**

- 132.** The expansion process in the throttling device of a vapour compression cycle is

- (a) isothermal process
- (b) adiabatic process
- (c) isenthalpic process
- (d) isentropic process

**Ans.(c)**

- 133.** Lowering the evaporator pressure in a vapour compression cycle

- (a) decreases the required work and COP
- (b) increases the required work and COP
- (c) increases the required work and decreases the COP
- (d) decreases the required work and increases the COP

**Ans.(c)**

- 134.** In ammonia-water vapour absorption refrigeration system

- (a) ammonia is the refrigerant and water is absorbent
- (b) ammonia is the absorbent and water is refrigerant
- (c) both ammonia and water are refrigerants
- (d) both ammonia and water are absorbents

**Ans.(a)**

- 135.** Air refrigeration is preferably used in aircrafts because

- (a) it uses air that is available in plenty in the atmosphere
- (b) it has high COP
- (c) its weight per tons of refrigeration is low
- (d) it is cheaper

**Ans.(c)**

- 136.** What is the ratio of maximum tangential stress ( $\sigma_t$ ) and maximum radial stress ( $\sigma_r$ ) of a solid disk flywheel ?

- (a)  $\frac{\sigma_t}{\sigma_r} = 0.5$
- (b)  $\frac{\sigma_t}{\sigma_r} = 1.0$
- (c)  $\frac{\sigma_t}{\sigma_r} = 1.5$
- (d)  $\frac{\sigma_t}{\sigma_r} = 2.0$

**Ans.(b)**



**137.** The cone angle of a pivot bearing is increased by 2%. The maximum load carrying capacity at the bearing will increase by

- (a) 0.05% (b) 1%  
(c) 0.5% (d) 0%

**Ans.(c)**

**138.** Why are gear teeth made harder?

- (a) To avoid wear (b) To avoid pitting  
(c) To avoid abrasion (d) To avoid tensile strength

**Ans.(a)**

**139.** A structural member subjected to an axial compressive force is called

- (a) beam (b) Column  
(c) frame (d) strut

**Ans.(b)**

**140.** Volumetric strain of a rectangular body subjected to an axial force, in terms of linear strain  $e$  and Poisson's ratio  $\mu$ , is equal to

- (a)  $e(1-2\mu)$  (b)  $e(1-\mu)$   
(c)  $e(1-3\mu)$  (d)  $e(1+\mu)$

**Ans.(a)**

**141.** Torsional rigidity of a solid circular shaft of diameter  $d$  is proportional to

- (a)  $d$  (b)  $d^2$   
(c)  $d^4$  (d)  $1/d^2$

**Ans.(c)**

**142.** Two shafts, one solid and the other hollow, are made of the same materials and are having length and weight. The hollow shaft as compared to solid shaft is

- (a) More strong (b) Less strong  
(c) Have some strength (d) None of the above

**Ans.(a)**

**143.** The point of contra-flexure occurs only in

- (a) Continuous beams (b) Cantilever beams  
(c) Overhanging beams (d) Simply supported beams

**Ans.(c)**

**144.** Which of the following theorem is used for the equilibrium of the body applied with three concurrent coplanar forces?

- (a) Varignon's theorem (b) Lamé's theorem  
(c) Pythagoras theorem (d) Hamilton theorem

**Ans.(b)**

**145.** A body of mass 5 kg accelerates at a constant rate of  $2 \text{ m/s}^2$  on a smooth horizontal surface due to an external force acting at  $30^\circ$  with horizontal. The magnitude of the force is

- (a)  $10 \cos 30^\circ \text{ N}$  (b)  $10 \sin 30^\circ \text{ N}$   
(c)  $10/\cos 30^\circ \text{ N}$  (d)  $10/\sin 30^\circ \text{ N}$

**Ans.(c)**

**146.** In case of a circular section the section modulus is given as

- (a)  $\pi d^2/16$  (b)  $\pi d^3/16$   
(c)  $\pi d^3/32$  (d)  $\pi d^4/64$

**Ans.(c)**

**147.** Leaf springs are subjected to

- (a) bending stress (b) tensile stress  
(c) shear stress (d) compressive stress

**Ans.(a)**

**148.** The strength of a beam mainly depends on

- (a) centre of gravity of the section  
(b) its weight  
(c) section modulus  
(d) bending moments

**Ans.(c)**

**149.** According to Bernoulli's equation

- (a)  $Z + \frac{P}{w} + \frac{v^2}{2g} = \text{constant}$   
(b)  $Z + \frac{P}{w} - \frac{v^2}{2g} = \text{constant}$   
(c)  $Z - \frac{P}{w} - \frac{v^2}{2g} = \text{constant}$   
(d)  $Z - \frac{P}{w} + \frac{v^2}{2g} = \text{constant}$

**Ans.(a)**

**150.** The length of the divergent portion of venturimeter in comparison to convergent portion is

- (a) less
- (b) more
- (c) same
- (d) more or less depending on capacity

Ans.(b)

151. Orifice meter is used for measurement of

- (a) Temperature
- (b) Pressure
- (c) Rate of flow
- (d) Viscosity

Ans.(c)

152. When Venturimeter is inclined, then for a given flow it will show

- (a) less reading
- (b) more reading
- (c) same reading
- (d) inaccurate reading

Ans.(c)

153. A Manometer is used to measure

- (a) Discharge
- (b) Pressure
- (c) Volume
- (d) Temperature

Ans.(b)

154. During the opening of a valve in a pipelines, the flow is

- (a) Steady
- (b) Unsteady
- (c) Uniform
- (d) Free vortex

Ans.(b)

155. Water at 20°C is flowing through a 20 cm diameter pipe.

Take kinematic viscosity of water at 20°C = 0.0101 stoke.  
Assume that the changes from laminar to turbulent at  $Re = 2320$ . The critical velocity will be

- (a) 1.117 cm/s
- (b) 11.17 cm/s
- (c) 111.7 cm/s
- (d) 0.117 cm/s

Ans.(a)

156. Froude number is the ratio of inertial force to

- (a) Gravitation force
- (b) Surface tension
- (c) Elasticity
- (d) Viscosity

Ans.(a)

157. Any change in load is adjusted by adjusting following parameter on turbine

- (a) Absolute velocity
- (b) Blade velocity
- (c) Net head
- (d) Flow

Ans.(d)

158. Kaplan turbine

- (a) is used where high head is available
- (b) has poor part-load efficiency
- (c) has inlet adjustable guide vanes
- (d) has adjustable runner vanes

Ans.(d)

159. The speed of an imaginary turbine, identical with the given turbine, which will develop a unit power under unit head, is known as

- (a) Normal speed
- (b) Abnormal speed
- (c) Unit speed
- (d) Specific speed

Ans.(d)

160. In a centrifugal pump casing, the flow of water leaving the impeller is

- (a) Rectilinear flow
- (b) Radial flow
- (c) Free vortex motion
- (d) Forced vortex motion

Ans.(d)

161. The efficiency of a centrifugal pump is maximum when its blades are

- (a) Bent forward
- (b) Bent backward
- (c) Bent forward first and then backward
- (d) Bent backward first and then forward

Ans.(b)

162. To avoid cavitation in centrifugal pumps

- (a) Suction pressure should be low
- (b) Delivery pressure should be low
- (c) Suction pressure should be high
- (d) Delivery pressure should be high

Ans.(c)

163. Loss of energy per unit volume due to friction in case of flow through a pipe at length L and diameter D is expressed as

- (a)  $4fL \frac{v^2}{2gD}$
- (b)  $4f \left( \frac{L}{D} \right) \times \left( \frac{v^2}{g} \right)$
- (c)  $4f \left( \frac{L}{D} \right) \left( \frac{\rho v^2}{2g} \right)$
- (d)  $4f \left( \frac{L}{D} \right) \times \left( \frac{\rho v^2}{2} \right)$

Ans.(a)



**164.** In an isothermal process, the heat transfer is

- (a) less than the work transfer
- (b) equal to the work transfer
- (c) less than or equal to the work transfer
- (d) more than the work transfer

**Ans.(b)**

**165.** A heat engine receives 1000 kJ of heat and produces 600 kJ of work. The amount of heat rejected in kJ and the efficiency percentage of the engine, respectively will be

- (a) 400, 40%
- (b) 400, 60%
- (c) 600, 40%
- (d) 600, 60%

**Ans.(b)**

**166.** The efficiency of a Carnot Engine depends on

- (a) the nature of the working fluid
- (b) the duration of working of the engine
- (c) the capacity of the engine
- (d) the temperature limits of the working fluid

**Ans.(d)**

**167.** In case of S.I. engine to have high thermal efficiency of fuel air mixture ratio should be

- (a) lean
- (b) rich
- (c) irrespective of mixture
- (d) chemically correct

**Ans.(b)**

**168.** For the same output, same speed and same compression ratio the thermal efficiency of a two stroke cycle petrol engine as compared to that for stroke cycle petrol engine is

- (a) more
- (b) less
- (c) same as long as compression ratio is same
- (d) same as long as output is same

**Ans.(b)**

**169.** The chemically correct stoichiometric ratio for petrol is

- (a) 14.8 : 1
- (b) 11 : 1
- (c) 18 : 1
- (d) 15 : 1

**Ans.(a)**

**170.** The mean effective pressure of an Otto cycle is the ratio between

- (a) the network produced and the clearance volume
- (b) the network produced and the swept volume

(c) the network produced and the cylinder volume

(d) the network produced and the crank case volume

**Ans.(b)**

**171.** The Otto cycle thermal efficiency, with usual notation, is given as, where  $r$  is compression ratio and  $\gamma$  is the adiabatic index

- (a)  $\eta_0 = 1 - r^{\gamma-1}$
- (b)  $\eta_0 = 1 - r^\gamma$
- (c)  $\eta_0 = 1 - \left(\frac{1}{r^{\gamma-1}}\right)$
- (d)  $\eta_0 = 1 - \left(\frac{1}{r^\gamma}\right)$

**Ans.(c)**

**172.** For the same inlet condition and compression ratio, the efficiency of an Otto cycle is

- (a) lower than that of the diesel cycle
- (b) lower than or equal to that of the diesel cycle
- (c) higher than that of the diesel cycle
- (d) higher than or equal to that of the diesel cycle

**Ans.(c)**

**173.** At triple point, there are

- (a) three constant thermodynamics properties
- (b) three states of matter in equilibrium
- (c) three or more modes of energy transfer
- (d) three degrees of freedom

**Ans.(b)**

**174.** As the pressure increases, the saturation temperature of the vapour

- (a) increases
- (b) decreases
- (c) increases first and then decreases
- (d) decreases first and then increases

**Ans.(a)**

**175.** The difference between the temperature of the superheated steam and the liquid-vapour saturation temperature at the corresponding pressure is known as

- (a) the degree of superheated
- (b) the extent of superheat
- (c) the approach of superheat
- (d) the limit of superheat

**Ans.(a)**

**176.** Metacentric height is the distance between

- (a) metacentre and water surface
- (b) metacentre and centroid
- (c) metacentre and centre of gravity
- (d) metacentre and centre of buoyancy

**Ans.(c)**

**177.** The centre of gravity of the volume of the liquid displaced by an immersed body is called

- (a) metacentre
- (b) centre of buoyancy
- (c) centre of gravity
- (d) centroid

**Ans.(b)**

**178.** The ratio of actual measured head to head imparted to fluid by impeller for a centrifugal pump is known as

- (a) mechanical
- (b) volumetric
- (c) manometric
- (d) impeller

**Ans.(c)**

**179.** The process used for relieving the internal stresses previously set up in the metal and for increasing the machinability of steel, is

- (a) normalising
- (b) full annealing
- (c) process annealing
- (d) spheroidising

**Ans.(b)**

**180.** The process of making hollow casting of desired thickness by permanent mould without the use of cores is known as

- (a) die casting
- (b) slush casting
- (c) pressed casting
- (d) centrifugal casting

**Ans.(d)**

**181.** According to indian standard specifications, a plain carbon steel designated by 40C8 means that the percentage of carbon content is

- (a) 0.04
- (b) 0.35 to 0.45
- (c) 0.4 to 0.6
- (d) 0.6 to 0.8

**Ans.(d)**

**182.** A moving mandrel is used in

- (a) wire drawing
- (b) tube drawing
- (c) metal cutting
- (d) forging

**Ans.(b)**

**183.** Crater wear takes place in a single point cutting tool at the

- (a) flank
- (b) side rake
- (c) face
- (d) tip

**Ans.(c)**

**184.** The relationship between tool life (T) and cutting speed (V) is expressed as, where n and C are constant

- (a)  $V^n T = C$
- (b)  $V/T = C$
- (c)  $VT^n = C$
- (d)  $T/V = 0$

**Ans.(c)**

**185.** Black colour is generally painted on

- (a) oxygen cylinder
- (b) acetylene cylinder
- (c) hydrogen cylinder
- (d) None of the above

**Ans.(a)**

**186.** Consumable electrodes is used in

- (a) carbon arc welding
- (b) submerged arc welding
- (c) TIG arc welding
- (d) MIG arc welding

**Ans.(d)**

**187.** The directional solidification in casting can be improved by using

- (a) chills and chaplets
- (b) chills and padding
- (c) chaplets and padding
- (d) chills, chaplets and padding

**Ans.(b)**

**188.** The purpose of chaplets is

- (a) just like chills to ensure directional solidification
- (b) to provide efficient venting
- (c) to support the cores
- (d) to join upper and lower parts of the moulding box

**Ans.(c)**

**189.** The centre of gravity of a complex link in a four bar chain mechanism will experience

- (a) No acceleration
- (b) Only linear acceleration
- (c) Only angular acceleration
- (d) Both linear and angular acceleration

**Ans.(a)**

**190.** The power from the engine to the rear axle of an automobile is transmitted by means of

- (a) Worm and worm wheel (b) Spur gears  
(c) Bevel gears (d) Hooke's joint

**Ans.(d)**

**191.** The included angle for the v-belt is usually

- (a)  $10^\circ$  to  $20^\circ$  (b)  $20^\circ$  to  $30^\circ$   
(c)  $30^\circ$  to  $40^\circ$  (d)  $60^\circ$  to  $80^\circ$

**Ans.(c)**

**192.** In railway axle boxes, the bearing used is

- (a) Cylindrical roller bearing  
(b) Deep groove ball bearing  
(c) Double row spherical roller bearing  
(d) Double row self-aligning ball bearing

**Ans.(a)**

**193.** When the sleeve of a Porter governor moves upwards, the governor speed

- (a) Increases  
(b) Decreases  
(c) Remains unaffected  
(d) First increases and then decreases

**Ans.(a)**

**194.** When the load on engine increases, it becomes necessary to increase the supply of working fluid and when the load decreases, less working fluid is required. The supply of the working fluid to the engine is controlled by a

- (a) D-slide valve  
(b) Governor  
(c) Meyer's expansion valve  
(d) Fly wheel

**Ans.(b)**

**195.** For high speed engines, the cam follower should move with

- (a) Uniform velocity  
(b) Simple harmonic motion  
(c) Uniform acceleration and retardation  
(d) Cycloidal motion

**Ans.(b)**

**196.** The minimum required centre distance of two mating spur gears is decided based on

- (a) Surface compressive strength of the gear material  
(b) Bending strength of the gear material  
(c) Ultimate strength of the gear material  
(d) Fatigue strength of the gear material

**Ans.(b)**

**197.** Which of the following bearings can take large thrust loads?

- (a) Deep-Groove ball bearing  
(b) Filling-Notch ball bearing  
(c) Self-aligning ball bearing  
(d) Angular-Contact bearing

**Ans.(d)**

**198.** The cotter joint is used to connect two rods which are in

- (a) Tension only  
(b) Compression only  
(c) Tension and Compression only  
(d) Shear only

**Ans.(c)**

**199.** Which of the following statements regarding 'mitre gears' is correct?

These are employed for

- (a) minimum back-lash  
(b) great speed reduction  
(c) equal speed  
(d) minimum axial thrust

**Ans.(c)**

**200.** Regarding journal bearing under film lubrication condition, which of the following statements is correct?

Frictional resistance is

- (a) directly proportional to the presence  
(b) independent of the area  
(c) proportional to the speed of rotation  
(d) inversely proportional to the viscosity of the lubricant

**Ans.(c)**