

PUNJAB PUBLIC SERVICE COMMISSION

**Objective Type Test (Aug-2017) for Recruitment of Lecturer Mechanical Engineering
in the Department of Technical Education & Industrial Training, Govt. of Punjab.**

READ INSTRUCTIONS BEFORE FILLING ANY DETAILS OR ATTEMPTING TO ANSWER THE QUESTIONS.

Candidate's Name _____

Father's Name _____

Date of Birth

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DD MM YYYY

Category Code*

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(*as given in the admit card)

OMR Response Sheet No. _____

Roll No. _____

Candidate's Signature (Please sign in the box)

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Question
Booklet Set

A

Booklet Series No. _____

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant columns (other than the columns related to marking responses to the questions) of the Optical Mark Reader (OMR) response sheet, supplied separately.	9. The candidates shall ensure that the responses are marked in correct manner and any adverse impact due to wrong marking of responses would be the responsibility of the respective candidate. The following are some of the examples of wrong marking of responses on the OMR response sheet.
2. Use only blue or black ball point pen to fill the relevant columns on this page. Use of fountain pen may leave smudges which may make the information given by the candidate here illegible.	10. The candidates, when allowed to open the question paper booklet, must check the booklet to confirm that the booklet has complete number of pages, the pages printed correctly and there are no blank pages. In case there is any such error in the question paper booklet then the candidate should immediately bring this fact to the notice of the invigilation Staff and obtain a booklet of the same series as given earlier.
3. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible.	11. The serial number of the new booklet should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of question booklet.
4. Before attempting the paper, the candidate must fill all the columns given above on this page and sign at the appropriate place.	12. The question paper booklet has 14 pages.
5. Each candidate is required to attempt 100 questions in 120 minutes, except for orthopaedically/visually impaired candidates, who would be given 40 extra minutes, by marking correct responses on the OMR sheet which would be supplied separately to the candidates.	13. Each question shall carry three marks.
6. The candidate must write the following on the OMRs sheet:	
(a)Serial number of OMR sheet supplied to him/her for marking the responses to the questions.	
(b)Serial number of the question booklet	
(c) Series of the question booklet. Failure to do so may lead to cancellation of candidature or any other action which the Commission may deem fit.	
7. The candidate should darken the appropriate response to the question by completely darkening the appropriate circle/oval according to his/her choice of response i.e. a, b, c or d in the manner shown in the example below.	14. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet using blue or black ball point pen.
8. Partly darkening the circle/oval on the OMR response sheet or using other symbols such as tick mark or cross would not result in evaluation of the response as the OMR scanner can only interpret the answers by reading the darkened responses in the manner explained in preceding paragraph. Darkening more than one circle/oval as response to a question shall also be considered as wrong answer.	15. There is no negative marking for wrong answers or questions not attempted by the candidate.

1. Who among the following personalities is also known by the name of Gurudev?
 - a) Dr. S. Radhakrishnan
 - b) Shyama Prasad Mukherjee
 - c) Rabindra Nath Tagore
 - d) Bankim Chandra Chatterjee
2. Sabarmati Ashram, set up by Mahatma Gandhi is located at which of the following places?
 - a) Ahemdabad
 - b) Porbandar
 - c) Gandhinagar
 - d) Dandi
3. In a cricket match season, West Indies defeated Newzealand four times, India defeated Newzealand three times, Australia defeated West Indies three times, West Indies defeated India only once and India defeated Australia once. Which country lost most of the times?
 - a) India
 - b) West Indies
 - c) Newzealand
 - d) Australia
4. In which of the following districts, the Fateh Burj – Chappar Chiri Memorial located?
 - a) SAS Nagar
 - b) Rupnagar
 - c) Fatehgarh Sahib
 - d) Amritsar
5. EARN is related to RANE and BOND is related to NODB in the same way as TEAR is related to:
 - a) AERT
 - b) ATRE
 - c) ARET
 - d) REAT
6. Outer wheeler Island has recently been named after which of the following personalities?
 - a) A.P.J. Kalam
 - b) C.V. Raman
 - c) Atal Bihari Vajpyee
 - d) Meghnad Saha
7. Find the incorrect match among the following:

a) Jeff Bezos	Microsoft
b) Kiran Mazumdar Shaw	Bicon
c) Indra Nooyi	Pepsi Co.
d) Sundar Pichai	Google
8. In a certain code BOARD is written as 53169 and NEAR is written as 2416. How is NODE written in that code?
 - a) 2894
 - b) 2934
 - c) 2694
 - d) None of the above

9. 12 33 96 ? 852 2553

- a) 285
b) 288
c) 250
d) 384
- 10. Who among the following is given ‘Best Actor Award’ in the recent 64th National Film Awards?
 - a) Akshay Kumar
 - b) Aamir Khan
 - c) Ranbir Kapoor
 - d) Nawazudin Siddiqui
- 11. Who among the following is Captain of Indian Women Cricket Team?
 - a) Harmanpreet Kaur
 - b) Mithali Raj
 - c) Ekta Bisht
 - d) Jhulan Goswami
- 12. Who among the following is Chairman of Niti Aayog?
 - a) Narendra Modi
 - b) Raghuram Rajan
 - c) Arvind Panagariya
 - d) Arun Jaitley
- 13. The inspiration of “Liberty, Equality and Fraternity” was derived from:
 - a) French Revolution
 - b) American Revolution
 - c) Russian Revolution
 - d) Italian Revolution
- 14. Which one of the following describes India as a secular state?
 - a) Fundamental Rights
 - b) Directive Principles of State Policy
 - c) Preamble of the Constitution
 - d) Fifth Schedule
- 15. Why is the sky blue most of the time?
 - a) Blue light is scattered more than other colours as it has shorter wavelength
 - b) Blue light is scattered more than other colours as it has longer wavelength
 - c) Red light is scattered more than other colours as it has longer wavelength
 - d) Red light is scattered more than other colours as it has longer wavelength

16. Which of the following is not a fundamental right?
- a) Right to Life
 - b) Right to property
 - c) Right to education
 - d) Right to equality
17. Who among the following is not appointed by the President of India?
- a) Governor
 - b) Chief Justice of Supreme Court
 - c) Chief Justice of High Court
 - d) Vice President of India
18. Who is the Chairperson of the Lok Sabha?
- a) President
 - b) Prime Minister
 - c) Speaker
 - d) Minister of Parliamentary Affairs
19. Radiography is an imaging technique that uses:
- a) Visible light
 - b) X rays
 - c) microwaves
 - d) Laser light
20. Which of the following statements is true with reference to sound waves?
- a) Human ear is capable of detecting sound waves ranging between 20Hz and 20000 Hz
 - b) Sound waves in air are transverse waves
 - c) Sound generally travels faster in gases and liquids than in solids
 - d) Sound can travel through vacuum
21. Which of the following statements is true?
- a) Indus Valley Civilization was a Bronze Age Civilization.
 - b) Indus Valley Civilization was not based on urban planning.
 - c) Indus Valley Civilization was an Iron Age Civilization
 - d) Indus Valley Civilization had no contact with the outside world
22. The daily range of temperature is greater in:
- a) Coastal areas
 - b) Small islands
 - c) Interior regions
 - d) High mountain summits

23. Millennium Development Goals have been set up for:
- a) All Countries
 - b) Developed Countries
 - c) Developing Countries
 - d) OECD Countries
24. “One country, one tax” describes:
- a) Income tax
 - b) GST
 - c) Sales tax
 - d) Corporate tax
25. Exports from India will receive a boost when:
- a) The domestic currency appreciates
 - b) The domestic currency depreciates
 - c) The domestic currency remains unchanged
 - d) The US dollars depreciates
26. Which is the best known structure among the ancient ruins of the Indus Valley civilization in Mohenjodaro?
- a) Temple
 - b) Granary
 - c) Great Bath
 - d) Palace
27. Aryabhatta was an ancient -----
- a) Priest
 - b) Astronomer & Mathematician
 - c) Warrior
 - d) Ruler
28. Which district of Punjab has the largest population according to the Census of India 2011?
- a) Jalandhar
 - b) Amritsar
 - c) Ludhiana
 - d) Ferozepur
29. Humidity in the air is measured by:
- a) Hydrometer
 - b) Hygrometer
 - c) Opisometer
 - d) Barometer

30. Tropic of Cancer does not pass through which of the following Indian states?
- Gujarat
 - West Bengal
 - Uttar Pradesh
 - Mizoram
31. Assertion (A): In constant pressure type gas turbines, large quantity of air is used, in excess of its combustion requirements.
 Reason (R): Excess air is used to compensate for inevitable air-loss due to leakage in the system.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is NOT the correct explanation of a
 - (A) is true but (R) is false
 - (A) is false but (R) is true
32. Which of the following is NOT a method for the design of Air-conditioning system?
- Velocity reduction method
 - Equal friction method
 - Equal pressure method
 - Static regain method
33. Two identical pipes of length ' L ', diameter ' d ' and friction factor ' f ' are connected in parallel between two points. For the same total volume flow rate with pipe of same diameter ' d ' and same friction factor ' f ', the single length of the pipe for a constant pressure drop will be
- $\frac{L}{2}$
 - $\frac{L}{\sqrt{2}}$
 - $\sqrt{2}L$
 - $\frac{L}{4}$
34. A solid shaft and a hollow shaft of equal length transmit equal torques and develop equal maximum stress then they will have equal
- polar moment of area
 - polar section modulus
 - cross sectional area
 - angle of twist
35. In a planar kinematic chain l links are connected through p pairs. The relationship between l and p is given by
- $l = p - 1$
 - $l = 2p - 2$
 - $l = 2p - 3$
 - $l = 2p - 4$
36. In simple harmonic motion, the acceleration is proportional to:
- time period
 - displacement
 - velocity
 - momentum

37. Which of the following type of gears is recommended for a speed reduction of 50: 1
- Spur
 - Helical
 - Worm
 - Bevel
38. The rated life of a ball bearing is:
- proportional to the load
 - inversely proportional to the load
 - inversely proportional to the square of the load
 - inversely proportional to the cube of the load
39. A 300 mm diameter basketball of 2 mm wall thickness has been inflated to a pressure of 100 kPa. The value of hoop stress developed is equal to
- 10 MPa
 - 5 MPa
 - 3.75 MPa
 - 2.75 MPa
40. The load carrying capacity of a hydro-dynamically lubricated journal bearing depends on
- Speed only
 - Viscosity only
 - Radial Clearance only
 - Speed, Radial Clearance and Viscosity
41. For two gears to mesh
- The diametral pitch of both gears must be the same
 - Tooth thickness of both gears must be same
 - Number of teeth on both gears must be same
 - Whole depth of both gears must be same
42. Which one of the following steels has the highest carbon content?
- Mild steel
 - Eutectic steel
 - Hypo - eutectic steel
 - Hyper - eutectic steel
43. Addition of sulphur to steel increases its
- Wear resistance
 - Corrosion resistance
 - Hardness
 - Machinability
44. The carbon content in wrought iron is
- less than 0.01 percent
 - between 0.01 to 1.0 percent
 - between 1.0 and 3.0 percent
 - between 3.0 and 5.0 percent

45. With increasing the pressure ratio, the volumetric efficiency of a reciprocating compressor
- remains same
 - increases
 - decreases
 - can not be predicted
46. Assertion (A): Pressurised water reactor (PWR) nuclear power plant use superheated steam.
Reason (R): An increase in superheat at constant pressure increases the cycle efficiency.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
47. Which of the following forces does NOT act on a fluid in rest?
- Gravity force
 - Hydrostatic force
 - Surface tension force
 - Viscous force
48. During choking of nozzle
- the mass flow rate through nozzle is maximum
 - the mass flow rate through nozzle is minimum
 - the mass flow rate through the nozzle is zero
 - the mass flow rate through the nozzle is a function of pressure drop.
49. In a beam, the point of contraflexure corresponds to a section with
- shear force is zero
 - shear force is maximum
 - bending moment is zero
 - bending moment is maximum
50. The locus of a point on a thread unwound from a cylinder will be
- an involute
 - a helix
 - a straight line
 - a cycloid
51. Which type of key is preferred for mounting shifting gears in a gear box?
- Saddle key
 - Flat key
 - Taper key
 - Splines
52. In the design of spur gears, the Barth's equation is used to express
- Velocity Factor
 - Geometry Factor
 - Size Factor
 - Surface Condition Factor
53. With reference to iron – carbon diagram, pearlite phase is made up of alternate layers of
- Ferrite and martensite
 - Ferrite and cementite
 - Martensite and cementite
 - Cementite and bainite

54. Which one of the following is a copper free alloy?
- German silver
 - Muntz metal
 - White metal
 - Gun metal
55. The molding process employed for thermoplastic materials is
- Injection and extrusion method
 - Compression and transfer molding method
 - Die casting method
 - Continuous casting method
56. Rat tail defect in a casting is due to
- mold expansion
 - metal expansion
 - metal mold expansion
 - none of the above
57. Depth of cut in turning operation is the total reduction in the
- diameter of the work
 - radius of the work
 - radius of the work in one pass of the tool
 - diameter of the work in one pass of the tool
58. Shell molding process requires pattern made of
- wood
 - sand
 - plastic
 - metal
59. The following operations are involved in producing powder metallurgy parts.
- L. Sintering
M. Pressing
N. Atomising
O. Blending
- The correct sequence of operations is:
- M, N, L, O
 - M, N, O, L
 - N, O, L, M
 - N, O, M, L
60. Helical gears can be cut on
- universal milling machine
 - horizontal milling machine
 - vertical milling machine
 - planetary milling machine
61. Which of the following rule is used in designing of riser of metal casting mould?
- Chvorinov's rule
 - Lever rule
 - Phase rule
 - Bernoulli's rule

62. By higher octane number of SI fuel, it is meant that the fuel has
- longer ignition delay
 - higher flash point
 - lower viscosity
 - higher heating value
63. Which of the following heat exchanger gives parallel straight-line pattern of temperature distribution for both cold and hot fluids?
- Parallel-flow with unequal heat capacities
 - Parallel-flow with equal heat capacities
 - Counter flow with unequal heat capacities
 - Counter flow with equal heat capacities
64. Assertion (A): Heat transfer at high temperature is dominated by radiation rather than convection.
Reason (R): Radiation depends on fourth power of temperature while convection depends on unit power relationship.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
65. The choking in compressors implies
- no flow of air
 - fixed mass flow rate regardless of pressure ratio
 - reducing mass flow rate regardless of pressure ratio
 - increased inclination of chord with air stream
66. Irrational flow occurs when
- flow takes place on a duct of uniform cross-section at constant mass flow rate
 - stream lines are curved
 - there is no net rotation of fluid element about its mass centre
 - fluid element does not undergo any change in size or shape
67. Kennedy's theorem states that if three bodies are undergoing plane motion relative to each other, their instantaneous centers will lie on a
- point
 - straight line
 - circle
 - triangle
68. In a vibrating system with single degree of freedom with viscous damping, the critical damping is a function of
- damping coefficient and mass
 - damping coefficient and stiffness
 - damping coefficient, mass and stiffness
 - mass and stiffness
69. The taper on a cotter varies from
- 1: 6 to 1: 10
 - 1: 20 to 1: 24
 - 1: 30 to 1: 34
 - 1: 36 to 1: 40

70. Two mating spur gears have 25 teeth and 75 teeth. The pinion rotates at 1260 rpm. What is the rotational speed of the gear?
- 420 rpm
 - 840 rpm
 - 1060 rpm
 - 1260 rpm
71. Which one of the following is a *n-type* semiconductor?
- Phosphorus in Silicon
 - Boron in Silicon
 - Aluminum in Silicon
 - Indium in Silicon
72. Process I requires 30 units of fixed cost and 5 units of variable cost per piece, while process II requires 70 units of fixed cost and 2 units of variable cost per piece. For a company producing 10 pieces per day
- process I should be chosen
 - process II should be chosen
 - either of the processes could be chosen
 - a combination of process I and process II be chosen
73. If the demand of an item is doubled and the ordering cost halved, the economic order quantity
- remains unchanged
 - increases by a factor of $\sqrt{2}$
 - is doubled
 - is halved
74. Which of the following are the inversions of a double slider crank chain?
- Whitworth quick return motion
 - Scotch Yoke
 - Oldham's Coupling
 - Rotary Engine

Select the correct answer using the codes given below:

Codes:

- 1 and 2
 - 2 and 3
 - 1, 3 and 4
 - 2,3 and 4
75. Principal stresses at a point in a plane stressed element are :
 $\sigma_x = \sigma_y = 500 \text{ N/m}^2$. Normal stress on the plane inclined at 45° to x-axis will be
- 0
 - 500 N/m^2
 - 707 N/m^2
 - 1000 /m^2

76. A shaft was initially subjected to a bending moment and then was subjected to torsion. If the magnitude of bending moment is found to be the same as that of the torque, then the ratio of maximum bending stress to shear stress would be
- a) 0.25
 - b) 0.50
 - c) 2.0
 - d) 4.0
77. The buckling load will be maximum for a long column, if
- a) one end of the column is clamped and the other end is free
 - b) both ends of the column are clamped
 - c) both ends of the column are hinged
 - d) one end of the column is hinged and the other end is free
78. The S-N curve for steel becomes asymptotic nearly at
- a) 10^3 cycles
 - b) 10^4 cycles
 - c) 10^6 cycles
 - d) 10^9 cycles
79. The backlash for spur gears depends upon
- a) module
 - b) pitch line velocity
 - c) tooth profile
 - d) both (a) and (b)
80. In design of power screws, Acme threads are preferred over the square threads because Acme threads
- a) offer better efficiency than square threads
 - b) have less wear and therefore more life
 - c) are easier to machine and permit use of a split nut
 - d) require lower torque to raise the load
81. In a machinery, a shaft is supported on one end by a taper roller bearing. At the other end, one may use.
- a) a ball bearing
 - b) another taper roller bearing
 - c) a self-aligning ball bearing
 - d) no other bearing
82. The finishing operation on a C40 steel component of length 120mm is done at 60 m/minute cutting speed. If the spindle speed and feed are 440 rpm and 0.1 mm/rev, respectively while the over travel of the tool beyond the length of the job is 2mm, then machining time for one pass in minutes is
- a) 1.77
 - b) 2.17
 - c) 2.77
 - d) 3.77
83. An optical gauge works on the principle of
- a) Reflection of light rays
 - b) Polarization of light rays
 - c) Interferences of light rays
 - d) Dispersion of light rays

84. One reversible engine operates between 1600 K and T K and another reversible engine operates between T K and 400 K. If both engines have same heat input and output, then the temperature T must be equal to
- 1000 K
 - 1200 K
 - 1400 K
 - 800 K

85. By higher octane number of SI fuel, it is meant that the fuel has
- longer ignition delay
 - higher flash point
 - lower viscosity
 - higher heating value

86. Match List I and List II and select the correct answer using the codes given below the lists:

List I	List II
(Material properties)	(Test to determine material properties)

- | | |
|------------------------------|------------------|
| A. Ductility | 1. Impact test |
| B. Toughness | 2. Fatigue test |
| C. Endurance limit | 3. Tension test |
| D. Resistance to penetration | 4. Hardness test |

Codes:

- A-3 B-2 C-1 D-4
- A-4 B-2 C-1 D-3
- A-3 B-1 C-2 D-4
- A-4 B-1 C-2 D-3

87. If the principal stresses corresponding to a two-dimensional state of stress are σ_1 and σ_2 and σ_1 is greater than σ_2 and both are tensile, then which one of the following would be the correct criterion for failure by yielding, according to the maximum shear stress criterion, σ_{yp} being the yield point stress ?

a)
$$\frac{(\sigma_1 - \sigma_2)}{2} = \pm \frac{\sigma_{yp}}{2}$$

b)
$$\frac{\sigma_1}{2} = \pm \frac{\sigma_{yp}}{2}$$

c)
$$\frac{\sigma_2}{2} = \pm \frac{\sigma_{yp}}{2}$$

d)
$$\sigma_1 = \pm 2\sigma_{yp}$$

88. The centrifugal tension T_c for maximum power to be transmitted by the belt is given by

- $T_c = 3T$
- $T_c = 2T$
- $T_c = T/2$
- $T_c = T/3$

Where T = Maximum allowable belt tension

89. The minimum number of teeth to avoid interference in a two wheel set of equal size, when addendum is one module, is given by
- $\frac{2}{\sqrt{1+3\sin^2 \phi} - 1}$
 - $2\left[\sqrt{1+3\sin^2 \phi} - 1\right]$
 - $2\left[\sqrt{1+3\sin^2 \phi} + 1\right]$
 - $\frac{2}{\sqrt{1+3\sin^2 \phi} + 1}$
90. When pure metals and some eutectic alloys solidify, the interface between the liquid and solid metals is a well defined smooth surface. As the solidification advances towards the center the grains become larger, the thickness of grains 'x' at time 't' is given by
- $K_1\sqrt{t}$
 - K_1/\sqrt{t}
 - $K_1\sqrt{2t}$
 - K_1/t
- where K_1 is a constant, which depends upon the metal poured and the mould material.
91. A cutting tool is designated as $0^0-10^0-6^0-6^0-8^0-75^0-1\text{mm}$. In this designation the side cutting edge angle of the tool is
- 0^0
 - 6^0
 - 8^0
 - 75^0
92. A manufacturing company produces 200 pistons per shift of 8 hours. If the standard time per piece of piston is 2.4 minute the productivity would be
- 33.33%
 - 66.66%
 - 100%
 - 125%
93. Choose the incorrect statement. The Second Law of Thermodynamics indicates that
- complete conversion of low grade energy into high grade energy is impossible
 - heat and work are not completely interchangeable
 - reversible and irreversible are two distinct processes
 - it is possible to transfer heat from low temperature to high temperature if heat extracted is exactly equal to work delivered.
94. A device used to heat feed water by utilizing the heat in the exhaust flue gases before leaving through the chimney, is known as
- superheater
 - economizer
 - reheater
 - none of the above

95. The specific speed of a turbine is expressed as

- a) $\frac{N\sqrt{P}}{H}$
- b) $\frac{N\sqrt{P}}{H^2}$
- c) $\frac{N\sqrt{P}}{H^{3/4}}$
- d) $\frac{N\sqrt{P}}{H^{5/4}}$

96. If a material had a modulus of elasticity of $2.1 \times 10^6 \text{ N/m}^2$ and a modulus of rigidity of $0.8 \times 10^6 \text{ N/m}^2$, then the approximate value of the Poisson's ratio of the material would be

- a) 0.26
- b) 0.31
- c) 0.47
- d) 0.5

97. The surface of the gear tooth below the pitch circle is called the

- a) flank
- b) face
- c) undercut
- d) bottom land

98. Degree of freedom of a rectangular block resting on a plane table is

- a) 0
- b) 2
- c) 3
- d) 6

99. The grinding wheels are produced by mixing the appropriate grain size of the abrasive with the required bond and pressed into the shape. The standard marking system of a specified grinding wheel is

51 A 36 L 5 V 23

For which characteristic of the grinding wheel the letter 'L' stands for

- a) type of bond
- b) type of grain
- c) type of grade
- d) manufacturer's reference

100. The goal of basic EOQ model is to minimize

- a) order size
- b) ordering cost
- c) sum of purchasing and ordering cost
- d) sum of ordering and holding cost
