Question Booklet Series: **A** *Question Booklet Serial No.* 282558

PULEET – 2015

Important: *Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.*

Roll No. ***In Figure*** ***In Words***

O.M.R. Answer Sheet Serial No.

Signature of Candidate: _____ *Signature of Invigilator:* _____

Time: 90 Minutes **Number of Questions: 75** **Maximum Marks: 75**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. Please check that this Question Booklet contains 75 Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen. There shall be negative marking for wrong answer, ¼ of the marks of the question will be deducted for every wrong answer.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The University will provide logarithmic tables. Borrowing of log table or other material is not allowed.
11. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
12. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
13. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
14. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
15. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
16. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less the $\sqrt{5}$, then a ϵ

A) $(-3, \infty)$ B) $(3, \infty)$ C) $(-\infty, -3)$ D) $(-3,3)$

2. The sum of 20 terms of the series

$1 + (1 + 3) + (1 + 3 + 5) + (1 + 3 + 5 + 7) + \ldots\ldots\ldots$ is

A) 400 B) 2870 C) 5740 D) 1540

3. For what values of α and β, the following simultaneous equations have an infinite number of solution?

$x + y + z = 5, \quad x + 3y + 3z = 9, \quad x + 2y + \alpha x = \beta$

A) 2, 7 B) 3, 8 C) 8, 3 D) 7, 2

4. If $\text{Cos } A = \frac{4}{5}$, then $125 \text{ Cos } (\frac{A}{2}) \text{ Cos } (\frac{5A}{2}) =$

A) 9 B) -19 C) 45 D) $-\frac{9}{2}$

5. The perpendicular bisector of the line segment joining the points P (1,4) and Q (k,3) has γ – intercept – 4, then a possible value of k is

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

6. The circle $x^2 + y^2 - 6x - 10y + c = 0$ does not intersect or touch any axis of coordinates and the point (1, 4) lies inside the circle. Then the range of possible values of c is given by

A) $25 < c < 29$ B) $c > 9$ C) $c > 25$ D) $c < 29$

7. The values of λ for which the radius of curvature of the curve $x^2 = 2\lambda y$ at the point (0,0) is 3, is

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

8. In the Taylor series expansion of $e^x + \sin x$ about the point $x = \pi$, the coefficient of $(x-\pi)^2$ is

A) e^π B) $\frac{1}{2}e^\pi$ C) $1 + e^\pi$ D) $e^\pi - 1$

9. If $e^u = x^3 + y^3 + z^3 - 3xyz$, then the value of $(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z})^2 U$ is

A) $9/(x + y + z)$ B) $-9/(x + y + z)$

C) $9/(x + y + z)^2$ D) $-9/(x + y + z)^2$

10. The function $f(x,y) = 2x^2 + 2xy - y^3$ has

A) Only one stationary point at (0,0)

B) Two stationary points at (0,0) and $(\frac{1}{6}, -\frac{1}{3})$

C) Two stationary points at (0,0) and (1, -1)

D) No stationary points

11. The solution of the differential equation

$$\frac{dy}{dx} + \frac{(2x+y)}{(2y+x)} = 0 \text{ is}$$

A) $2(x^2 + y^2) + xy$ = constant
B) $x^2 + 2xy + y^2$ = constant
C) $x^2 + xy + y^2$ = constant
D) $(2x + y) / (2y + x)$ = constant

12. $\int_0^{\pi/2} \int_0^{\pi/2} \sin(x + y)\, dxdy$ is

A) Zero
B) π
C) $\pi/2$
D) 2

13. The value of $\int_0^{\infty} \int_0^{\infty} \frac{e^{-y}}{y} dydx$ by changing the order of integration is

A) Zero
B) $^3/_4$
C) 1
D) -1

14. For a scalar function $\phi(x, y, z) = x^2 + 3y^2 + 2z^2$ the directional derivative at the point P (1, 2, -1) in the direction of a vector $(\hat{i} - \hat{j} + 2\hat{k})$ is

A) -18
B) $-3\sqrt{6}$
C) $3\sqrt{6}$
D) 18

15. The value of $\oint_C \vec{F} \cdot \vec{dr}$ by Stoke's theorem, where $\vec{F} = y^2\,\hat{i} + x^2\,\hat{j} - (x + z)\,\hat{k}$ and C is the boundary of the triangle with vertices at (0,0,0), (1,0,0) and (1,1,0) is:-

A) $\frac{1}{2}$
B) $\frac{1}{3}$
C) $\frac{1}{4}$
D) $\frac{1}{5}$

16. The path followed by a projectile is determined entirely by

A) Its initial velocity and effects of gravitational acceleration
B) Effects of the gravitational acceleration
C) Effects of the gravitational acceleration and air resistance
D) Its initial velocity and effects of air resistance

17. When a ballerina spinning with arms outstretched, pulls her arms in, her angular velocity

A) Increases due to principle of conservation of angular momentum
B) Decreases due to principle of conservation of angular momentum
C) Increases due to principle of conservation of moment of inertia
D) Decreases due to principle of conservation of moment of inertia

18. Resonance in a system happens, when

A) There is an amplitude peak at the driving frequency approaching infinity
B) There is an amplitude dip at the driving frequency approaching infinity
C) There is an amplitude dip at driving frequency close to natural frequency of the system
D) There is an amplitude peak at driving frequency close to natural frequency of the system.

19. A police siren emits a sinusoidal wave of frequency 300Hz. Speed of the sound is 340m/s. If the siren is moving at 30m/s, the wavelength of the waves ahead of the source is

A) 2.05m B) 1.03m C) 3.0m D) 1.58m

20. Which of the following is false

A) Lens that is thicker at the center than its edges is a converging lens
B) Lens that is thinner at the center than its edges is a diverging lens
C) A diverging lens has negative focal length
D) A converging lens always makes virtual image

21. The intensity of the transmitted light is half of the incident light, when

A) The transmission axes of the two polaroids are perpendicular to each other
B) The transmission axes of the two polaroids are parallel to each other
C) The transmission axes of the two polaroids are inclined at 45° to each other
D) The transmission axes of the two polaroids are anti parallel to each other

22. In a Laser, one of the most important requirement is to

A) Have a less populated higher energy level in comparison to the lower energy level
B) Have equally populated higher energy level as lower energy level
C) Have a more populated higher energy level in comparison to the lower energy level
D) Have an unoccupied higher energy level

23. Specific heat of a-solid is

A) Amount of heat conducted to the colder end of the solid kept 1m apart
B) Amount of heat required to raise the temperature of 1 Kg of the solid by 1^0C
C) Amount of heat radiated by unit mass of the solid in 1 sec
D) Amount of heat absorbed by the solid in contact with another hot solid

24. A gas thermometer is based on the principle that

A) The volume of a gas contracts with temperature at constant pressure
B) The volume of a gas expands with temperature at constant pressure
C) The pressure of a gas at constant volume decreases with temperature
D) The pressure of a gas at constant volume increases with temperature

25. When a dielectric is subjected to sufficiently strong electric field

A) Dielectric breakdown takes place and dielectric becomes a conductor
B) Dielectric breakdown takes place and dielectric becomes an insulator
C) Dielectric breakdown takes place and dielectric behaves like a super-conductor
D) Dielectric breakdown takes place and infinite charge can be stored in it

26. The total magnetic flux through a closed surface is

A) Proportional to electric charge enclosed by the surface
B) Always zero
C) Proportional to magnetic charge enclosed by the surface
D) Proportional to the surface current

27. An *L-C* circuit undergoes electrical oscillations with an angular frequency given as

A) $w = \sqrt{LC}$ B) $w = \sqrt{1/LC}$ C) $w = 1/LC$ D) $w = LC$

28. In the photoelectric effect, the stopping potential is

A) Directly proportional to the frequency of the incident light
B) Inversely proportional to the frequency of the incident light
C) Directly proportional to the intensity of the incident light
D) Inversely proportional to the intensity of the incident light

29. Which of the following is false?

A) Packing fraction of hexagonal closed packed solid is maximum
B) Packing fraction of hexagonal closed packed solid is same as the face centered solid
C) Packing fraction of simple cubic is less than the body centered solid
D) Packing fraction of body centered solid is more than the face centered solid

30. The emission of a β^- particle involves the transformation of a

A) Neutron into a proton, electron and an antineutrino
B) Neutron into a proton, electron and a neutrino
C) Proton into a neutron, electron and an antineutrino
D) Proton into a neutron, electron and a neutrino

31. Ohm's law is applicable to

A) Linear, bilateral elements B) Non-linear, bilateral elements
C) Non-linear, unilateral elements D) All of the above

32. A 3-phase 6.6/0.4 kV transformer is to supply a load at 230 V. Its secondary should be connected in

A) Star B) Delta C) Open-delta D) Series

33. A sinusoidal voltage varies from zero to maximum of 250 V. The voltage at the instant of 60^0 of the cycle will be

A) 150V B) 216.5V C) 125V D) 108.25V

34. At the leading power factor, the voltage regulation of transformer is

A) Negative B) Positive
C) Zero D) Is independent of power factor

35. The form factor for dc supply voltage is always

A) Zero B) Unity C) Infinity D) Between 0 and 1

36. How will the speed of DC shunt motor change when the applied voltage is half the normal voltage

A) There will be no change
B) The speed will fall slightly below the normal speed
C) The speed will become half the normal speed
D) The speed will increase slightly above normal speed

37. The no load voltage of a certain generator is 220 V, and the rated voltage is 200 V. Then Voltage regulation is

A) 1% B) 9% C) 10% D) None of these

38. If copper loss of a transformer at 7/8 th full load is 4900 W, then its full load copper would be

A) 5600 W B) 6400 W C) 373 W D) 429 W

39. A series R-L-C circuit, consisting of R = 10 ohms, XL=20 ohms and XC=20 ohms is connected across an ac supply of 100 V (rms). The magnitude and phase angle (with reference to supply voltage) of the inductive coil are respectively

A) 100 V, 90° B) 100 V,-90° C) 200 V, -90° D) 200V, +90°

40. For a 4% drop in supply voltage, the torque of an induction motor increases by

A) 4 % B) 8% C) 16% D) 2%

41. The process of adding impurities to a pure semiconductor is called

A) Doping B) Mixing C) Diffusing D) Filtering

42. In bipolar transistor biased in the forward active region the base current is $I_B = 50\ \mu A$ and the collector current is $I_c = 2.7$ mA. Then α is

A) 0.949 B) 54 C) 0.982 D) 0.018

43. Modulation index of an AM wave is changed from 0 to 1. The transmitted power is

A) Halved
B) Increased by 50%
C) Quadrupled
D) Unchanged

44. The minimum no. of NOR gates required to implement A(A+B')(A+B'+C) is equal to

A) 0 B) 3 C) 4 D) 7

45. The input resistance of a Cathode Ray Oscilloscope is of the order of

A) Tens of ohm B) Mega ohm C) Kilo ohm D) Fraction of an ohm

46. NRZI means

A) Non Radiation Zero Inverter
B) Not Referred as Zero Inverter
C) No Ratio Zero Inverted
D) Non Return to Zero Inverted

47. How is a JK flip flop made to toggle?

A) J=0,K=0 B) J=0,K=1 C) J=1,K=0 D) J=1,K=1

48. A Zener diode

A) Is useful as an amplifier
B) Has a negative resistance
C) Has a high forward voltage
D) Has a sharp breakdown at low reverse voltage

49. An operational amplifier has a common mode gain of 0.01 and a differential mode gain of 10^5. Its common mode rejection ratio would be

A) 10^3 B) 10^5 C) 10^7 D) 10^{-7}

50. If properly biased, Junction Field Effect Transistor will act as a

A) Voltage controlled voltage source
B) current controlled voltage source
C) Voltage controlled current source
D) Current controlled current source

51. Consider a logical address space of 4 pages of 2048 words each mapped into a physical memory of 32 frames. How many bits are there in logical address?

A) 12 bits B) 14 bits C) 13 bits D) 11 bits

52. What will be the output of the following if the array begins at 65486?

```
main {
    int a[ ]={12,14,17,37,65}
    printf("%u%u", a+1, &a+l);
    }
```

A) 65487, 65487 B) 14, 65486 C) 14, 17 D) 65486, 65486

53. What will be output of following program?

```
main {
    int i=3, j=2, k=0, m;
    m =++ | &&++j || ++ k;
    printf ("\n%d%d%d%d", l,j,k,m);
    }
```

A) -2 3 0 1 B) -2 2 0 1 C) -2 3 0 0 D) -2 3 1 1

54. We want to round off a; a float to an int value. The correct way to do so would be

A) b= (int) (a+0.5)
B) b= int (a+0.5)
C) b= (int) ((+0.5)
D) b= (int) (((int) (a)+0.5)

55. Which of the following operation in C does not associates from the right?

A) = B) + = C) ++ D) >

56. The average access time of a disk is

A) Seek from + rotational latency time
B) Seek time
C) Rotational latency + transfer time + Seek time
D) Rotational latency + transferee time

57. Which object is constant in the declaration statement int *const ptr

A) ptr
B) Object provided by ptr
C) Both ptr and object pointed to by ptr
D) The given declaration not valued

58. In the declaration statement int * p (int, int); p refers to

A) Pointer to a function that accepts two integer of return an integer
B) Function that accepts two integers and return a pointer to an integer
C) Pointer to an array of two integers
D) None of these.

59. For separate program space, which of the following system call can be executed by a process in UNIX?

A) fork B) execlp C) exec D) None of these

60. The largest positive number that can be stored in a computer that has 16 bit word length and uses twos complement arithmetic is

A) 32 B) 32767 C) 32768 D) 65536

61. A Carnot cycle is having an efficiency of 0.75. If the temperature of the high temperature reservoir is 727°C, what is the temperature of low temperature reservoir?

A) 23^0C B) -23^0C C) 0^0C D) 250^0C

62. An ideal air standard Otto cycle has a compression ratio of 8.5. If the ratio of the specific heats of air is 1.4, what is the thermal efficiency in percentage of the Otto cycle?

A) 57.5 B) 45.7 C) 52.5 D) 95

63. When initially dry and saturated steam flows through a nozzle, the ratio of actual discharge to calculated discharge is

A) Equal to 1.0
B) Greater than 1.0
C) Less than 1.0
D) Independent of inlet conditions

64. A small steam whistle (perfectly insulated and doing no shaft work) causes a drop of 0.8 kJ/kg, the kinetic energy of the steam at entry is negligible, the velocity of the steam at exit is

A) 4 m/s B) 40 m/s C) 80 m/s D) 120 m/s

65. Consider a velocity field V=K (yi + xk), where K is a constant. The vorticity about z-axis is

A) – K B) K C) –K/2 D) K/2

66. Streamlines, pathlines and streaklines are virtually identical for

A) Uniform flow
B) Flow of ideal fluids
C) Steady flow
D) Non-uniform flow

67. A rod of length L and diameter D is subjected to a tensile load P. Which of the following is sufficient to calculate the resulting change in diameter?

A) Young's modulus
B) Shear modulus
C) Poisson's ratio
D) Both Young's & Shear modulus

68. A concentrated load P acts on a simply supported beam of span L at a distance L/3 from the left support. The bending moment at the point of application of the load is given by

A) PL/3
B) 2PL/3
C) PL/9
D) 2PL/9

69. A solid circular shaft of diameter 100 mm is subjected to an axial stress of 50 MPa. It is further subjected to a torque of 10 kN-m. The maximum principal stress experienced on the shaft is closest to

A) 41 MPa
B) 82 MPa
C) 164MPa
D) 204 MPa

70. A solid circular shaft of 60 mm diameter transmits a torque of 1600 Nm. The value of maximum shear stress developed is

A) 37.72 MPa
B) 47.72 MPa
C) 57.72 MPa
D) 67.72 MPa

71. The main purpose of dam construction is

A) Irrigation
B) Flood control
C) Hydroelectricity
D) Provide water to industry

72. The study of interaction between the living species and the environment is called

A) Biology
B) Antology
C) Ecology
D) Zoology

73. A food chain consists of

A) Producers, consumers, decomposers
B) Producers, carnivores, decomposers
C) Primary producer, herbivores, carnivores
D) Producers, primary consumers, carnivores

74. The variety and the numbers of living organisms present in an ecosystem is called

A) Biodiversity
B) Biopiracy
C) Biogeography
D) Bioprospecting

75. Process of dumping solid waste in a scientifically designated land area is called

A) Solid waste disposal
B) Waste dumping
C) Sanitary landfilling
D) Reduction

x-x-x

Panjab University, Chandigarh

P.U.L.E.E.T.-2015

ANSWERS / KEY

1	2	3	4	5	6	7	8	9	10
D	B	A	D	C	A	C	B	D	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	D	X	B	B	A	A	D	B	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	C	B	D	A	B	B	A	D	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
A	A	B	A	B	B	C	B	D	C
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
A	C	B	A	B	D	D	D	C	A
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
C	D	A	A	B	C	A	B	B	B
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
B	A	B	B	A	C	D	D	B	A
71	**72**	**73**	**74**	**75**					
C	C	A	A	C					

Note : An 'X' in the key indicates that either the question is ambiguous or it has printing mistake. All candidates will be given credit for this question.