Indian Institute of Technology Hyderabad
Kandi -502285 , Telangana, India

Advt. No. IITH/2023/NF/15

Application Number of the Candidate

Name of the Post: Question Paper Id:

Date & Time of the Exam: Duration: 01 hr. 30 min

Scheme of the Exam:

Topic	Number of Question	Marks
General English and Aptitude	16	16
Work Related Topics (Theory & Experiment)	32	32
Computer Fundamentals (Theory & Experiment)	32	32

Instructions to fill the responses in the OMR answer sheet

1. Candidate must write his/her **application number** in the designated box on the top of OMR answer sheet
2. Candidate must write the post code and Question paper code in the designated boxes on the top of OMR answer sheet
3. Candidate must sign in the box provided in the OMR answer sheet
4. Each answer sheet must be signed by the invigilator in the space printed in the OMR answer sheet
5. Only one response to be selected & marked. In case more than one response is marked for a single question or no response is marked for a question, no marks will be given for that question.
6. Partially filled circles shall not be considered as responses
7. Candidate must use Black ball point pen only to fill his/her responses
8. Rough work should not be done on the OMR answer sheet.
9. Candidate can use the designated page(s) of the question booklet for the purpose of rough work

General English (Communication Skills)

1. Choose the word opposite in meaning to the italicised word to fill in the blank for the following sentence: "I feel *at home* in the hostel but _____ in my house."
   a) unwelcome
   b) not happy
   c) ill at ease
   d) unpleasant

2. Out of the given alternatives choose the one which best expresses the meaning of the bold part of the sentence.

   Ant is believed to be the most **industrious** creature.
   a) Frequent
   b) Hardworking
   c) Irregular
   d) Scattered

3. Choose the antonym of the word **refute**
   a) Deny
   b) Futile
   c) Endorse
   d) Disturbed

4. Out of the suggested alternatives select the one which best expresses the same sentence in Indirect Speech.
   He said to me, "Where is the head office?"

   a) He asked me where the head office was.
   b) He questioned me that where the head office was.
   c) He spoke to know where was the head office.
   d) He told me where is the head office.

5. He deserves my thanks for ……… my purse and returned it to me without taking anything from it
   a) having found
   b) found
   c) find
   d) Founded

6. The synonym of NEBULOUS is
   a) tiny
   b) vague
   c) inadequate
   d) insignificant

7. The antonym of HINDRANCE is
   a) Agreement
   b) Encumbrance
   c) Consideration
   d) Aid

8. The company wanted the most qualified ……….. for the job
   a) personnel
   b) personel
   c) personell
   d) personnal

Aptitude

9. There are three objects with weight X, Y and Z Kgs respectively. The average weight of X, Y and Z is 50 Kg. If the average weight of X and Y is 40 Kg and that of Y and Z is 45 Kg, what is the weight of Y?
   a) 30
   b) 20
   c) 40
   d) 50

10. Given log(a/b) +log(b/a) = log (a+b), then which of the following option is true
    a) a=b
    b) a+b =1
    c) a-b = 1
    d) a+b = -1

11. Insert the missing number in the following series
    64, 48,30, 10, -12, …..?
    a) -36
    b) 36
    c) 12
    d) -12

12. A coin is thrown 3 times. What is the probability of getting at least one head?
    a) 1/8
    b) 2/4
    c) 3/6
    d) 7/8

13. Choose the even function from the given options
    a) $f(x) = x^2 + x$
    b) $f(x) = x^3 + x^2$
    c) $f(x) = x^4 + x^2$
    d) $f(x) = (x + 1)^2$

14. An apple costs Rs 7, while an orange costs Rs 5. A person spends a total of Rs 38 to buy these fruits. The number of apples that the man purchased were:
    a) 2
    b) 3
    c) 4
    d) 5

15. Two runners starting together run on a circular path taking 6 and 8 minutes, respectively, to complete one round. Assuming they both are running with constant speeds; how many minutes later do they meet again for the first time on the start line?
    a) 8
    b) 24
    c) 32
    d) 60

16. Which of the following is largest?
    a) 2^{50}
    b) 4^{30}
    c) 3^{40}
    d) 5^{20}

Technical Questions (Theory)

17. A vector **A** is solenoidal if its _____.
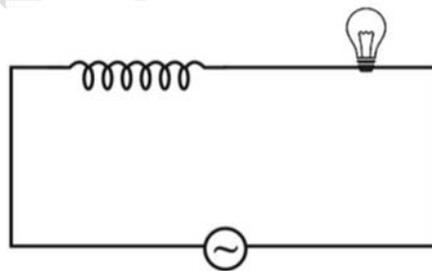   a) Divergence is zero
    b) Gradient is zero
    c) Divergence is non-zero
    d) Gradient is non-zero

18. Two bodies of mass m and $2m$ are connected by a spring constant k. The frequency of the normal mode is
    a) $\sqrt{3k/2m}$
    b) $\sqrt{k/2m}$
    c) $\sqrt{k/m)}$
    d) $\sqrt{2k/m)}$

19. According to Maxwell's law of distribution of velocities of molecules, the most probable velocity is
    a) Greater than the root mean square velocity
    b) Equal to the mean velocity
    c) Equal to root mean square velocity
    d) Less than root mean square velocity

20. The production of emf by maintaining a difference of temperature between the two junctions of two dissimilar metals is called
    a) Joule's effect
    b) Peltier effect
    c) Seebeck effect
    d) Thomson effect

21. When a particle executes Simple Harmonic Motion (SHM), there is always a constant ratio between its displacement and_____
    a) Time period
    b) Acceleration
    c) Mass
    d) Velocity

22. A spherical object falls with a terminal velocity of 10 m/s in air. If it is allowed to fall in vacuum, then
    a) the terminal velocity will be less than 10 m/s
    b) the terminal velocity will be greater than 10 m/s
    c) there will be no terminal velocity
    d) the terminal velocity will be Equal to 10 m/s

23. As temperature increases, the resistivity of a semiconductor
    a) decreases
    b) increases
    c) remains constant
    d) equals to One

24. A physical quantity is represented by an equation as P = π(c-s)(d-q), where c & s are length and d & q are area then the quantity P is
    a) length
    b) area
    c) volume
    d) square area

25. A sound wave travels from air to water. The angle of incidence is "i" and the angle of refraction is "r". If the Snell's law is valid then
    a) i > r
    b) r > i
    c) i = r
    d) i ≥ r

26. According to Maxwell, a changing Electric field produces
    a) Radiation Pressure
    b) EMF
    c) Magnetic field
    d) Electric current

27. In Bohr's model of an atom, which of the following is equal to $h/2\pi$
    a) Linear momentum
    b) Angular momentum
    c) Spin angular momentum
    d) Perimeter of the orbit or radius r

28. In which region of earth, the weight of a body is slightly greater than the other regions?
    a) At polar region
    b) At equator
    c) Tropic of Cancer
    d) None of this

29. An iron-cored coil is connected in series with an electric bulb to an AC source, as shown in the figure. If the iron piece is taken out of the coil, how will the brightness of the bulb be?

    a) Increase
    b) Decrease
    c) Oscillate (decrease and increase with time)
    d) Remain unaffected

30. An electron is moving with velocity $V = V_0\hat{x}$ and it is in a magnetic field $B = B_0\hat{y}$. It's de-Broglie wavelength
    a) increases with time
    b) decreases with time
    c) remains constant
    d) follow a sinusoidal path

31. Which law of thermodynamics states that energy cannot be created or destroyed, only transformed from one form to another?
    a) Zeroth law
    b) First law
    c) Second law
    d) Third law

32. When light is reflected from a mirror a change occurs in its
    a) Speed
    b) Frequency
    c) Phase
    d) Wavelength

Technical Questions (Experiments):

33. In the experiment to determine g by free fall method, a rectangular object is allowed to drop by a height h in time t, if **g** is constant then **h** vs **t²** graph should be
    a) Straight line
    b) Parabolic
    c) Hyperbola
    d) Sine function

34. If I_0 is the intensity of the incident plane polarized light and ϕ is the angle between the plane of polarizer and the analyzer, then the intensity (I) of the transmitted light is
    a) $I = I_0 \cos^2\phi$
    b) $I = I_0 \sin^2\phi$
    c) $I = I_0$
    d) $I = I_0 + I_0 \cos^2\phi$

35. Two sinusoidal voltages of equal frequencies and equal amplitudes with different phases are input to an oscilloscope. If the resultant pattern on the screen is circle, then the phase difference is
    a) 90 deg
    b) 180 deg
    c) 120 deg
    d) 360 deg

36. A sine wave is travelling in a medium. The minimum distance between the two particles always having same speed is
    a) $\lambda/4$
    b) $\lambda/3$
    c) $\lambda/2$
    d) λ

37. What polarization of light is used to observe the Faraday effect in any active material?
   a) Elliptically Polarized Light
   b) Linearly Polarized Light
   c) Circularly Polarized Light
   d) Unpolarized Light

38. In a Millikan's oil drop experiment the charge on an oil drop is calculated to be
   8.0×10^{-19}C. The number of excess electrons on the drop is
   a) 5
   b) 8
   c) 10
   d) 16

39. Which of the following statement is correct if a transistor is used in a common emitter
   configuration?
   a) Input is between the base and the emitter
   b) Output is between the base and the emitter
   c) Input is between the collector and the emitter
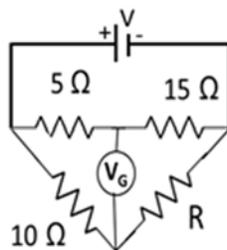   d) Output is between the base and the collector

40. A Zener diode is biased at Zener voltage, then it........
   a) Acts as a fixed resistance
   b) Never overheats
   c) Has a constant voltage across it
   d) Has a constant current passing through it

41. The volume of a cube is measured to be 1cm³ using a Vernier scale with least count
   0.1mm. What is the error in measuring the volume?
   a) 0.3mm³
   b) 3 mm³
   c) 30mm³
   d) 0.1mm³

42. A voltage (V) is applied to the circuit shown below. Find the value of R when $V_G = 0$.

   a) 5Ω
   b) 10Ω
   c) 20Ω
   d) 30Ω

43. What does the 'bandwidth' of an oscilloscope refer to?
    a) Frequency range that an oscilloscope can accurately measure
    b) Maximum voltage range that an oscilloscope can accurately measure
    c) Time range that an oscilloscope can accurately measure
    d) Full-width half maximum of the signal frequency that an oscilloscope can accurately measure

44. A material of original length L is stretched by a constant force F resulting a change in length of ∆L. How does the value of ∆L change if the cross-sectional area A of the material is doubled?
    a) No change
    b) 2∆L
    c) ∆L /2
    d) ∆L /4

45. Constructive interference is expected between two rays if their phase difference is
    a) Even multiple of π
    b) Even multiple of $\pi/2$
    c) Odd multiple of π
    d) Odd multiple of $\pi/2$

46. The resolution of an optical imaging system is limited by the phenomenon of
    a) Reflection
    b) Interference
    c) Refraction
    d) Diffraction

47. In four probe experiment, we avoid
    a) Wire resistance
    b) Contact resistance
    c) Sample resistance
    d) Sheet resistance

48. An ideal operational amplifier has
    a) Infinite voltage gain but not infinite band width
    b) Neither infinite voltage gain nor infinite band width
    c) Only infinite voltage gain
    d) Infinite voltage gain and infinite bandwidth

Computer fundamentals (Theory):

49. What are the protocols to copy file and folder from one machine to another?
    a) ssp
    b) scp
    c) cget/ssp
    d) gethem

50. How do you get static IP by command line?
    a) ips
    b) fig
    c) ifconfig
    d) configd

51. Which of the following commands goes to home directory?
    a) cdhome
    b) cd home
    c) cd ~
    d) None of the above

52. Which of the following is not a valid shell within Linux?
    a) bash
    b) zsh
    c) tcsh
    d) None of the above

53. What is the name of the directory under which files are usually kept if one wants to create a webpage?
    a) webdir
    b) html
    c) public_html
    d) homepage

54. Which format of hard disk is suitable for Linux to be used for large data storage?
    a) FAT32
    b) exFAT
    c) ext4
    d) NTFS

55. Which file type will use the lowest amount of storage for the same data?
    a) ASCII
    b) HDF5
    c) Binary
    d) Text file

56. In order to upload an HTML file to a web server, you use
    a) SMTP
    b) TCP
    c) HTTP
    d) scp

57. Which of the following commands can ONLY be run by the system administrator?
    a) Test
    b) run
    c) su
    d) do

58. Which command is used to find the location of an executable?
    a) which
    b) seek
    c) findexec
    d) location

59. What command is used to login from one machine to another?
    a) login
    b) connect
    c) ssh
    d) scp

60. What is the base operating system on which Linux is based on?
    a) DOS
    b) Windows
    c) MacOsX
    d) Unix

61. Which command is used to reboot a Linux machine?
    a) boot
    b) restart
    c) reboot
    d) None of the above

62. A hard disk is divided into tracks which are further subdivided into:
    a) clusters
    b) vectors
    c) sectors
    d) heads

63. Which of the following commands can be used to run the same job on a daily basis at a fixed (common) time?
    a) run
    b) rundaily
    c) crontab
    d) runfixed

64. Which command can be used to check if a given external Linux server is up or down?
    a) checkconn
    b) ping
    c) checkaccess
    d) test

Computer fundamentals (Experiment):

65. Which command gives you a detailed listing of files in a folder with the date?
    a) lo
    b) ls -d
    c) list
    d) ls -l

66. Which of the following commands can be used to print a specific environment variable?
    a) print
    b) dispenv
    c) display
    d) echo

67. What is the command line to copy a directory from one location to another location on a Unix machine?
    a) copy
    b) replicate
    c) dplct -r
    d) cp -r

68. Which command allows you to download a file from a website?
    a) get
    b) download
    c) wget
    d) webget

69. How to concatenate two files horizontally so that the new file has the same number of columns as the original?
    a) cat
    b) combine
    c) paste
    d) merge

70. How to concatenate two files vertically (by merging the columns) so that the new file has the same number of rows as the original?
    a) cat
    b) combine
    c) paste
    d) merge

71. How to check memory consumed by a running job?
    a) checkmem
    b) ps
    c) top
    d) testmem

72. How to generate a sequence of numbers in Linux?
    a) genseq
    b) Seq
    c) num
    d) generate

73. How to number lines in a file?
    a) linenum
    b) nol
    c) nl
    d) numl

74. Which of the following is not an editor in Linux?
    a) emacs
    b) gedit
    c) elm
    d) nano

75. Which of the following commands can be used to stop a running job?
    a) cancel
    b) kill
    c) stop
    d) forcekill

76. How to find duplicate lines in a file?
    a) uniq
    b) unique
    c) dupl
    d) checkdupl

77. How to check for specific words in a file?
    a) Search
    b) Grep
    c) Find
    d) seek

78. How to find files with a particular name on the filesystem?
    a) find
    b) seek
    c) lookout
    d) search

79. How to replace words in a file on the command line?
    a) replace
    b) sed
    c) swap
    d) ed

80. If you have a file with two columns containing numbers, which of the following commands will give the sum of the two columns?
    a) sum
    b) combine
    c) add
    d) awk

---------------------------------- **End of Question Paper**---