

No. IITH/40/R/2022/RTI/MS, dt.14.10.2022

Furnishing of Information under RTI Act.

- 1 Application No. & Date : IITHY/R/E/22/00107, dated.16.09.2022
 2 Name of the Applicant :
 3 Date of Receipt of Application : 16.09.2022

4	Information Sought	Information given and details of documents, if any, furnished.
	A) Give the Written test marks list of Appeared and Selected candidates to the post of Junior Technician-Biomedical Engineering of Advt No. IITH/2020/Rec/NF/8.	Written Test Marks of the candidates, who appeared for the written exam are enclosed as Annexure I. The List of candidates selected is enclosed as Annexure II.
	B) Give the Written test Examination Question paper for the post of Junior Technician-Biomedical Engineering of Advt No. IITH/2020/Rec/NF/8.	Question Paper attached as Annexure III.
	C) Give the Written test marks list of Skill test qualified candidates and selected candidates to the post of Junior Technician-Physics of Advt No.IITH/2021/Rec/NF/09.	Written Test scores of all candidates who have qualified in skill test are enclosed as Annexure IV. Selected candidates list is enclosed as Annexure V.
If you are not satisfied with the information provided, you may file an appeal with the following authority within 30 days:		
The Appeal, if any, should be addressed to:		Cmde M Nambiar, Ph.D. (Retd) Registrar & First Appellate Authority, IIT Hyderabad, Kandi, Sangareddy-502284 E-mail: registrar@iith.ac.in ; Tele: 040 2301 6055

Note: All the annexures are sent to registered mail ID.

Sd/-

(एम बद्रिनाथ)

(M Badrinath)

Joint Registrar & CPIO

Email: jr.cpio@iith.ac.in

Tele: 040 2301 6058

To,

**Junior Technician-Biomedical Engineering of Advt No.
IITH/2020/Rec/NF/8.**

CANDIDATE ID / APP NO	SCORE IN THE WRITTEN EXAM
1026	45
1031	40
10340	44
10369	35
10646	53
10816	64
10864	47
10869	53
11282	38
13186	45
13356	33
13505	47
13874	55
14117	41
14361	25
14566	41
15082	39
16091	56
16118	49
16211	59
16294	46
1648	43
1744	63
2376	41
2549	50
2634	47
2647	16
2846	53
414	37
4588	44
4885	37
5191	55
5634	51
6048	51
6429	61
7419	30
8119	32
8396	51
9402	55



Indian Institute of Technology Hyderabad

Kandi, Sangareddy – 502285, Telangana, INDIA

RESULTS OF THE WRITTEN TEST FOR THE POST OF JUNIOR TECHNICIAN-BIOMEDICAL ENGINEERING

HELD ON 17.12.2020

Candidates Selected for the post of Junior Technician-Biomedical Engineering

Sl. No	Category	Application No.
1	SC	1744

Sl. No	Category	Application No.
1	OBC	10816

Candidates under Waiting List

Sl. No	Category	Application No.
1	SC	6429

Sl. No	Category	Application No.
1	OBC	16211

Sd/-
Registrar



Indian Institute of Technology
Hyderabad

Indian Institute of Technology Hyderabad

Kandi -502285 , Telangana, India

Advt. No. IITH/2020/Rec/NF/8

Application Number of the Candidate

Name of the Post: JT (BIOMEDICAL) Question Paper Id:

3	7	1
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Date & Time of the Exam: 17/12/2020 @ 2:30 PM Duration: 01 hr. 30 min

Scheme of the Exam:

Topic	Number of Question	Marks
Work related Topics- Part A	55	55
Work related Topics- Part B	30	30
General English and Arithmetic-Part C	15	15

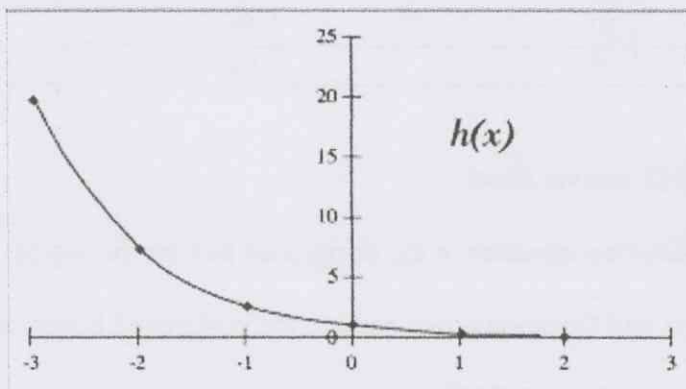
Instructions to fill the responses in the OMR answer sheet

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

Work related Topics- Part A

1. In a _____ system, shifted versions of the inputs result in similarly shifted versions of the output
 - a. Linear
 - b. Shifted
 - c. Delay
 - d. Time-invariant

2. The following graph is best described by the equation



- a. $h(x) = -mx + c$
 - b. $h(x) = e^{-x}$
 - c. $h(x) = e^x$
 - d. $h(x) = ax^2$
3. If $h(t)$ is the impulse response of an LTI system, then the system response to an input $x(t)$ is given by
 - a. h multiplied by x
 - b. h added to x
 - c. h convolved with x
 - d. h itself

4. What is the name of the transform defined by the following:

$$X(e^{j\omega}) = \sum_{n=-\infty}^{\infty} x[n]e^{-j\omega n}.$$

- a. Fourier transform
- b. Z transform
- c. Laplace transform
- d. Identity transform

5. What is the name of the transform defined by the following

$$X(z) = \sum_{n=-\infty}^{\infty} x[n]z^{-n}.$$

- a. Fourier transform
- b. Z transform
- c. Laplace transform
- d. Identity transform

6. An analog signal band limited to a frequency of f , must be sampled at _____ Hz to faithfully reconstruct it

- a. $2 * f$
- b. $f / 2$
- c. f
- d. $f - 2$

7. Analog signals can be converted to discrete signals by _____ operation

- a. Low pass filtering
- b. High pass filtering

- c. Sampling
 - d. Time shifting
8. 1001 in binary number system is equal to _____ in decimal
- a. 9
 - b. 10
 - c. 11
 - d. 12
9. Which of the following is a universal gate?
- a. AND
 - b. OR
 - c. NOT
 - d. NAND
10. Which of the following circuit is used to selectively connect one of the input lines to the output
- a. Multiplexer
 - b. Encoder
 - c. Decoder
 - d. Flip flop
11. The hex number 1A can be represented in binary as follows
- a. 00011000
 - b. 11101100
 - c. 00011011
 - d. 00011010

12. The difference equation $y[n] = (x[n] + x[n-1] + x[n-2]) / 3$ can be used to

- a. Block low frequencies
- b. High pass filter
- c. Smoothen sudden spikes
- d. Time shift

13. If $x(t)$ and $y(t)$ have fourier transforms $X(j\omega)$ and $Y(j\omega)$, $x(t)$ convolved with $y(t)$ has a fourier transform

- a. $X \cdot Y$
- b. $X+Y$
- c. $X-Y$
- d. H

14. A signal with 50 possible discrete signal levels can be quantized with _____ bits

- a. 7
- b. 6
- c. 5
- d. 4

15. A 16-bit addressing system with word length 1 byte can address a maximum memory of size _____ bytes

- a. 32 K
- b. 64 M
- c. 32 M
- d. 64 K

16. The Boolean function NOT (A AND B) gives an output _____ when A is TRUE and B is FALSE

- a. FALSE

- b. TRUE
- c. RACE
- d. INDETERMINATE

17. Fourier transform of a periodic signal is _____

- a. Aperiodic
- b. Periodic
- c. Continuous
- d. Discrete

18. A dirac delta function $\delta(x)$ has a value of ___ everywhere except at $t=0$ and satisfies the property $\int_{-\infty}^{\infty} \delta(x)dx = \text{___}$

- a. 0,0
- b. 0,1
- c. 1,0
- d. 1,1

19. A 4-bit counter can count from _____ to _____

- a. 0 to 15
- b. 1 to 16
- c. 0 to 7
- d. 1 to 8

20. The butterfly diagram illustrates how the _____ operation may be optimized

- a. Fourier transform
- b. Z transform
- c. Laplace transform
- d. Discrete Fourier Transform

21. Dot product of vectors $[1\ 2\ 3\ 4\ 5]$ and $[1\ 1\ 1\ 0\ 0]$ yields

- a. $[1\ 2\ 3\ 0\ 0]$
- b. $[1\ 1\ 1\ 0\ 0]$
- c. $[0\ 0\ 0\ 4\ 5]$
- d. 6

22. NOT (A OR B) is equal to

- a. (NOT A) OR (NOT B)
- b. (NOT A) AND (NOT B)
- c. A AND B
- d. A OR B

23. Adding the hex numbers 58 and 24 gives _____

- a. 7C
- b. C7
- c. 7B
- d. 7D

24. (i) Combinational logic circuits have 2-bit memories (ii) Latch / flip-flop is a basic unit of memory circuitry

- a. Both i and ii are false
- b. Both i and ii are true
- c. Only i is false
- d. Only ii is false

25. Duty cycle = _____

- a. Ratio of OFF time during every cycle to cycle time
- b. Ratio of ON time during every cycle to cycle time
- c. Ratio of ON time to OFF time during every cycle

- d. Ratio of OFF time to ON time during every cycle
26. Which of the following statements is false?
- PN junction conducts in one direction
 - Zener diode conducts in forward and reverse direction
 - A high reverse current will damage the PN junction diode
 - A high reverse current will damage the zener diode
27. In an Operational Amplifier
- Common mode gain is high
 - CMRR is high
 - Open Loop gain is low
 - High current flows through inverting and non-inverting terminals
28. In a non-inverting configuration of an operational amplifier , $R_i=2\text{ k}\Omega$ and $R_f = 200\text{ k}\Omega$, what is the gain?
- 100
 - 101
 - 101
 - 100
29. The input offset current in an operational amplifier is
- Difference in the collector current at the two input terminals
 - Difference in the base current at the two input terminals
 - Dependent on the currents at the two input terminals
 - Proportional to the gain of the operational amplifier
30. In LM 741 – the offset null can be used to
- Nullify input zero drifts

- b. Nullify input offset voltage
 - c. Nullify thermal noise
 - d. None of the above
31. The Fourier transform of a function $f(at)$ is given by
- a. $a F(\omega)$
 - b. $\frac{2}{a} F(\omega)$
 - c. $\frac{1}{a} F\left(\frac{\omega}{a}\right)$
 - d. None of the above
32. A plane wave of light as it travels from a medium of refractive index n_1 to a medium of refractive index n_2 undergoes reflection at the interface of two media. The reflected wave suffers a phase change of π , if
- a. $n_1 > n_2$
 - b. $n_1 < n_2$
 - c. $n_1 = n_2$
 - d. all the above
33. In Magnetic resonance imaging (MRI), the T1 recovery or longitudinal relaxation happens due to
- a. the exchange of spin energy to the surrounding lattice
 - b. dissipation of spin energy due to dephasing of spins
 - c. the magnetic field inhomogeneities
 - d. presence of local magnetic domains in sample
34. The biological window for penetration in biological tissues is defined by the wavelength range
- a. 350 nm to 600 nm

- b. 650 nm to 1300 nm
 - c. 1.4 μm to 5 μm
 - d. 5 μm to 10 μm
35. Which of the following is not true for an ideal Operational Amplifier?
- a. Infinite voltage gain
 - b. Zero input impedance
 - c. Zero output impedance
 - d. All above
36. A fiber optic temperature sensor works on the principle of
- a. temperature dependence of forbidden energy gap of the probe tip
 - b. Peltier effect
 - c. Planck's law of heat radiation
 - d. Thomson effect
37. Which of the following is not a requirement for a LASER to operate continuously
- a. Population inversion
 - b. Gain medium
 - c. flash lamp pumping
 - d. Resonant cavity
38. In a diode-based photodetector, light that is being detected is incident on the
- a. P- region
 - b. N- region
 - c. Depletion region
 - d. Transparent Metal Oxide Semiconductor Gate

39. In positron emission tomography (PET), the positron is emitted as a result of
- Alpha decay
 - Beta decay
 - Gamma decay
 - All the above
40. If $f(x)$ and $g(x)$ are two real functions, and $F(k)$ and $G(k)$ representing their respective Fourier transforms, which of the following is true? ($\mathfrak{F}\{\}$ represents Fourier transform operation, \otimes denotes convolution operation, $*$ denoted correlation operation)
- $\mathfrak{F}\{(f + g)^2\} = (F+G)^2$
 - $\mathfrak{F}\{(f + g)^2\} = F^2+G^2+2F.G$
 - $\mathfrak{F}\{(f + g)^2\} = F \otimes F + G \otimes G + 2 F \otimes G$
 - $\mathfrak{F}\{(f + g)^2\} = F * F + G * G + 2 F * G$
41. Which of the following imaging modality uses nonionizing radiations?
- Single photo emission tomography
 - X ray imaging
 - Photoacoustic tomography
 - Positron emission tomography
42. Typical amplitude of detected ECG signals are of the order of
- 0-5 millivolts
 - 0-5 microvolts
 - 100s of microvolts
 - 0-5 volts

43. During an event of depolarization of a cell membrane, the inside of the cell membrane is
- more negative than outside
 - more positive than outside
 - neutral
 - charged positive or negative depending on the stimulus
44. Electrooculograms (EOG) are biopotential measurements created by
- changes in cochlear conduction
 - chest or lung movements
 - movement of eyeballs
 - muscle movement of lips
45. In a cochlear implant, the signal from external transmitter is recorded at the implanted internal coil receiver by
- Infra-Red communication
 - Magnetic induction
 - Electrochemical methods
 - microcircuit connections
46. In MRI, the contrast is generated due to the
- spin relaxation of Hydrogen Nuclei
 - Beta decay
 - Free charges on Hydrogen nuclei
 - All the above
47. The sensing element in a conventional stethoscope is
- optical sensor
 - acoustic sensor
 - potential electrode sensor

- d. piezoelectric sensor
48. Two coils having equal resistance but different inductances are connected in series. The time constant of the series combination is the
- Sum of the time constants of the individual coils
 - Average of the time constants of the individual coils
 - Product of the time constants of the individual coils
 - None of the above
49. Five cells are connected in series in a row and five such rows are connected in parallel to feed the current to a resistive load of 1.3Ω . Each cell has an emf of 1.5 volts with an internal resistance of 0.2Ω . The current through the load will be
- 1 A
 - 3.33 A
 - 5 A
 - 7.5 A
50. A delta network of resistors is converted to an equivalent Y network, the resistances $R_{ab}=5 \Omega$, $R_{ac}=30 \Omega$, $R_{bc}=15 \Omega$ will be replaced by R_1 , R_2 , R_3 respectively by
- 1.5Ω , 3Ω , and 9Ω
 - 3Ω , 1.5Ω and 9Ω
 - 9Ω , 3Ω and 1.5Ω
 - 9Ω , 1.5Ω , and 3Ω
51. To present DC return between source and load, it is necessary to use
- Resistor between source and load
 - Capacitor between source and load
 - Inductor between source and load
 - None of the above

52. A differential amplifier has a differential gain of 10^4 and a common mode rejection ratio (CMRR) of 80 dB. The common mode gain will be
- 0
 - 0.5
 - 1
 - 2
53. The logical expression $Y = A + \bar{A}B$ is equivalent to
- $Y=AB$
 - $Y = \bar{A} + B$
 - $Y = A\bar{B}$
 - $Y=A+B$
54. A 10 bit analog to digital (A/D) converter is used to digitize an analog signal in the range 0 to 5 volts. The maximum peak to peak ripple voltage that can be allowed in the dc supply voltage is
- ~ 100 millivolts
 - ~ 50 millivolts
 - ~ 5 millivolts
 - ~ 1 millivolts
55. The impulse response of an R-L circuit is a
- Rising exponential function
 - Decaying exponential function
 - Dirac Delta function
 - Step function

Work related Topics- Part B

56. A biosignal can be measured using a X that converts the measurand directly into electrical energy. It can also be measured using a Y that first converts the measurand to another physical quantity, which is then converted to electrical energy using a Z .
- X: Transducer, Y: Sensor, Z: variable conversion element
 - X: Sensor, Y: Transducer, Z: variable conversion element
 - X: Sensor, Y: Transducer, Z: Signal processing circuit
 - X: Transducer, Y: Sensor, Z: Signal processing circuit
57. A Bioinstrument has three blocks cascaded, with each block having a input-output characteristic G_1 , G_2 and G_3 . What is the overall characteristic of the system?
- $G_1 \times G_2 \times G_3$
 - Convolution of the three characteristics
 - $G_1 + G_2 + G_3$
 - Correlation of the three systems
58. Piezoelectric sensor cannot be used to measure
- Displacement
 - Steady-state force
 - Strain
 - Heart sounds
59. Which of the following statements are true about strain gauge?
- Strain gauge is a non-linear device
 - Strain gauge is a sensor
 - Strain gauge requires a variable conversion element
 - Strain gauge is used to measure capacitance changes

60. Which of the following statements about inductance sensors is false?
- They have primary and secondary coils
 - They can be used to detect position
 - They are linear over a large range
 - They work on DC excitation
61. _____ refers to the closeness of the measured value to the actual value
- Precision
 - Accuracy
 - Repeatability
 - Sensitivity
62. Which of these is discretized in both time and amplitude?
- Discrete time
 - Analog
 - Digital
 - Fourier Spectrum
63. Which of the following is false about Capacitive-based displacement sensing?
- Capacitance changes measured as the distance between two parallel plates
 - It is a zero-order system
 - Capacitance changes measured as change in dielectric material
 - Voltage changes related to displacement
64. Which of these determines the color of the light emitted in an LED?
- Level of doping in P,N materials
 - Fabrication method used
 - Semiconductor material used
 - All of the above

65. An SMD 3.3 k Ω is given as

- a. 332
- b. 3R3
- c. 335
- d. None of the above

66. The three leads of a BJT are

- a. Emitter, base, gate
- b. Base, collector emitter
- c. Drain, gate, source
- d. Drain, gate, emitter

67. Which of these colors has the shortest wavelength?

- a. Blue
- b. Red
- c. Green
- d. Yellow

68. The nature of current that flows inside the neuron is

- a. Electronic
- b. Ionic
- c. Both a & b
- d. None of the above

69. The right leg drive in a ECG acquisition system is

- a. One of the electrodes used to calculate limb lead voltage
- b. One of the electrodes used to calculate chest lead voltage
- c. Noise suppression method
- d. None of the above

70. Which of these is false about the instrumentation amplifier in the context of bioamplifiers?

- a. They reduce noise
- b. They have high gain-bandwidth product
- c. They reduce loading effect
- d. None of the above

71. An optical isolator is used in the context of patient safety

- a. Reduce noise in signals acquired
- b. Used to electrically isolate the patient from power sources
- c. Protect the amplifier from power fluctuations
- d. None of the above

72. Wheatstone's bridge is

- a. Sensor
- b. Transducer
- c. Both a & b
- d. Variable conversion element

73. In an ECG system, chest leads measure voltage changes in

- a. Sagittal plane
- b. Frontal plane
- c. Transverse plane
- d. None of the above

74. Which of these is a Wilson Central Terminal related to?

- a. EMG
- b. EOG
- c. ECG
- d. All of the above

75. A 12 lead ECG system consists of

- a. Limb
- b. Chest
- c. Augmented leads
- d. All of the above

76. Which of these can measure an eye blink?

- a. Horizontal EOG
- b. Vertical EOG
- c. ECG
- d. All of the above

77. Which of these statements are true?

- a. Post synaptic potentials in the stellate cell are open-field form
- b. Post synaptic potentials in the pyramidal cell are open-field form
- c. Post synaptic potentials in the pyramidal cell are closed-field form
- d. None of the above

78. What is the minimum number of electrodes necessary to measure EEG?

- a. One
- b. Two
- c. Three
- d. Four

79. Which of these are part of the blood pressure wave?

- a. Systolic upstroke
- b. Dicrotic notch
- c. Systolic peak pressure
- d. All of the above

80. The highest systolic pressure is found in

- a. Right atrium
- b. Left atrium
- c. Left ventricle
- d. Right ventricle

81. Indirect measurement of blood pressure can be performed by

- a. Oscillometric method
- b. Sphygmomanometer
- c. Pulse transit time method
- d. All of the above

82. In regard to cardiac rate which of the following is false?

- a. Cardiac rate is typically fixed in a healthy individual
- b. Cardiac rate varies in a healthy individual
- c. High cardiac rate is called tachocardia
- d. Low cardiac rate is called bradycardia

83. Slow drifts in bioelectric signals can be removed by

- a. High pass filter
- b. Low pass filter
- c. Notch filter
- d. None of the above

84. A twisted pair electrode cable in the context of a bioamplifier

- a. Increases 50 Hz noise
- b. Reduces the signal drift
- c. Reduces 50 Hz noise
- d. Increases dynamic range of the bioamplifier

85. Which of these are related to the QRS complex in an ECG signal?

- a. Depolarization of atria
- b. Repolarization of ventricles
- c. Depolarization of ventricles
- d. Repolarization of atria

General English and Arithmetic-Part C

86. Ram and Rahim went shopping, but _____ couldn't find anything _____ liked.

- a. they, they
- b. they, those
- c. they, them
- d. those, they

87. The new information on Corona virus caused panic in the public and government _____.

- a. like
- b. likely
- c. alike
- d. dislike

88. He has been living in Germany _____ two years.

- a. for
- b. since
- c. from
- d. until

89. She _____ for the upcoming tennis tournament.

- a. trains

- b. is training
- c. will train
- d. is going to train

90. As there were no buses, she _____ home last night.

- a. has to walk
- b. has to walked
- c. had to walk
- d. had to walked

91. I must get to the market before it _____.

- a. close
- b. closes
- c. has closed
- d. closed

92. They will not come here, _____?

- a. won't they
- b. won't them
- c. will they
- d. will them

93. David said to Anna, "Mona will leave for her native place tomorrow".....Make the passive voice of the sentence.

- a. David told Anna that Mona will leave for her native place tomorrow.
- b. David told Anna that Mona left for her native place the next day.
- c. David told Anna that Mona would be leaving for her native place tomorrow.
- d. David told Anna that Mona would leave for her native place the next day.

94. _____ David had married in time, his kids would have been adult till now.

- a. If
- b. Unless
- c. When
- d. Hardly

95. She did not sing so _____ as her friend.

- a. good
- b. better
- c. best
- d. well

96. Complete the series: 2, 5, 10, 17, 26, ____, 50

- a. 30
- b. 41
- c. 37
- d. 40

97. If RAM = 18113, SYAM = 1925113, SITA = 199201, then GITA = ?

- a. 79201
- b. 19203
- c. 20201
- d. 100202

98. $39302 / 201 = ?$

- a. 195.53
- b. 195.54
- c. 194.35
- d. 195.34

99. Find the missing number in the series: 1, 2, 3, 5, 8, ?, 21, 3

- a. 15
- b. 13
- c. 17
- d. 16

100. Rakesh's age is twice the age of Ramesh and Ganesh put together. Which of the following cannot be the ages of Rakesh, Ramesh and Ganesh respectively?

- a. 34, 14, 20
- b. 19, 10, 9
- c. 22, 12, 10
- d. 23, 11, 11

**Junior Technician Physics- unior Technician-
Physics - Advt No.IITH/2021/Rec/NF/09**

CANDIDATE ID/ App ID	Score in Written Exam
669	58
1123	53
1691	49
29	44
1573	41
1612	41
1053	39
1014	38
1842	38
1682	37
1827	35
428	33
1636	32
1696	32
739	32
1596	28
1364	24



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Kandi – 502 284, Sangareddy, Telangana, INDIA

Notification No. IITH/2021/Rec/NF/09, dated 11.09.2021

**RESULTS FOR THE POST OF
JUNIOR TECHNICIAN (PHYSICS)**

SKILL TEST & WRITTEN TEST HELD ON 13 MARCH 2022

Selection List:

Sl. No	Appl. No.	Name
01	669	Mr Karthik Bhat
02	1691	Mr Vasudevarao Pavuluri
03	1123	Mr Shivaram Lakum

Waiting List:

Sl. No	Appl. No.	Name
01	29	Mr Mahesh Channaveeraswami Gaddadamath
02	1573	Mr P Vijay Kumar

Sd/-
Registrar