Seat	
No.	

Total No. of Pages: 12

### M.Phil/Ph.D. Entrance Examination, September - 2019 ENGINEERINGAND TECHNOLOGY

#### **Electronics and Telecommunication Engineering**

•				rsday, 19 - 09 - 2019 03.00 p.m.		Total Marks: 100		
Instru	ction	<u>ns</u> : 1)		All questions are compulsor	<b>.</b>			
		2)		Each question carries 2 ma	rks.			
		3)		Answers should be marked darkening the appropriate of		the given OMR answer sheet by		
		4)		Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.				
		5)		Follow the instructions give	en on	OMR Sheet.		
		6)		Rough work shall be done o paper.	n the	sheet provided at the end of question		
		7)	7) Only non-programmable calculators are allowed.					
				RESEARCH METH	<u>IOD</u>	<u>OLOGY</u>		
1) _				_	e w	hole population based on the		
C	bse	ervation	s n	nade on a small part.				
F	<b>A</b> )	Pseudo	)-i1	nference	B)	Objective inference		
(	<b>C</b> )	Inducti	ve	inference	D)	Deductive inference		
2) 7	Гуре	e-I Erro	r (	occurs if	_			
A	<b>A</b> )	the nul	1 h	ypothesis is rejected even	thou	igh it is true		
E	3)	the nul	1 h	ypothesis is accepted eve	n tho	ugh it is false		
(	<b>C</b> )	both th	e r	null hypothesis as well as	alteri	native hypothesis are rejected		
	) )			the above				

3)		Research and Development become the index of development of country. Which of the following reasons are true with regards to this statement?							
	A)	Because R&D targets the human	develo	opment					
	B)	Because R&D can improve the standard of living of the people in a country							
	C)	Because R&D reflect the true econin a country	nomic	and social conditions prevailing					
	D)	All the above							
4)	The	e data of research is							
	A)	Qualitative only	B)	Quantitative only					
	C)	Both (A) and (B)	D)	Neither (A) nor (B)					
5)	Eva	duation research is concerned with							
	A)	Why are we doing?	B)	What are we doing?					
	C)	How well are we doing?	D)	None of the above					
<b>6</b> )	Wh	ich of the following statement is co	rrect?						
	A)	Discoveries are researches							
	B)	Researches lead to discovery							
	C)	Invention and Research are related	d						
	D)	None of the above							
<b>7</b> )	Boo	oks and records are the primary sou	rces o	of data in:					
	A)	Clinical research							
	B)	Historical research							
	C)	Laboratory research							
	D)	Participatory research							

### **M/P Ent.**– 18

8)	Wha	at do you consider as the main aim o	f inte	erdisciplinary research?
	A)	To over simplify the problem of re	searc	h
	B)	To bring out holistic approach to r	esear	ch
	C)	To create a new trend in research n	netho	dology
	D)	To reduce the emphasis of single s	ubjec	t in research domain
9)	"A s	ystematic step-by-step procedure fo	llowi	ng logical process of reasoning"
	A)	Experiment		
	B)	Observation		
	C)	Deduction		
	D)	Scientific method		
10)	Rese	earch undertaken for knowledge sak	e is	
	A)	Pure Research		
	B)	Action Research		
	C)	Pilot study		
	D)	Survey		
11)	Rese	earch related to abstract ideas or co	ncent	rs is
,	A)	Empirical research	псер	
	B)	Conceptual Research		
		-		
	C)	Quantitative research		
	D)	Qualitative research		
12)		is the first step of Research p	roces	S
	A)	Formulation of a problem	B)	Collection of Data
	C)	Editing and Coding	D)	Selection of a problem

13)	The	first step in formulating a problem	is	
	A)	Statement of the problem		
	B)	Gathering of Data		
	C)	Measurement		
	D)	Survey		
14)	A	is an abstraction formed by ger	nerali	zation from particulars
	A)	Hypothesis		
	B)	Variable		
	C)	Concept		
	D)	Facts		
<b>15</b> )	In te	esting a Hypothesis the common err	or is	
	A)	Type I		
	B)	Type I and II		
	C)	Type II		
	D)	None of these		
<b>16</b> )	Fina	al stage in the Research Process is _		_
	A)	Problem Formulation	B)	Data Collection
	C)	Data Analysis	D)	Report Writing
<b>17</b> )	Sele	ecting sample units in just a "hit and i	miss'	' fashion is called
	A)	Convenience or Accidental sampling	ng	
	B)	Purposive sampling	_	
	C)			
	D)	Proportionate sampling		

18)		question which by its content struct be direction of a certain answer is cal		r wordings leads the respondent
	A)	Factual question	B)	Opinion question
	C)	Leading question	D)	Structural question
19)	In a	survey the number of questions is _		_
	A)	Unlimited		
	B)	Limited		
	C)	Both limited and unlimited		
	D)	None of the above		
20)	Cove	was of data callegted and agminited h	41	ang is called
20)		rce of data collected and compiled b	oy otr	iers is called
	A)	Primary		
	B)	Secondary		
	C)	Primary and Secondary		
	D)	None of the above		
21)		the main purpose is to for stigation.	mula	te a problem for more precise
	A)	Exploratory or Formulative study		
	B)	Descriptive study		
	C)	Diagnostic study		
	D)	None of the above		
22)		ethod of collecting primary data in mon interest interact is called	which	n a number of individuals with a
	A)	Telephone Interview	B)	Clinical Interview
	C)	Focused Interview	D)	Group Interview

23)	Mea	n, Median and Mode are.		
	A)	Measures of deviation		
	B)	Ways of sampling		
	C)	Measures of control tendency		
	D)	None of the above		
24)	Obs	ervation is a Physical and act	ivity.	
	A)	Mental		
	B)	Social		
	C)	Psychological		
	D)	Personal		
25)	AH	ypothesis which develops while plar	nning	the research is
	A)	Null Hypothesis		
	B)	Working Hypothesis		
	C)	Relational Hypothesis		
	D)	Descriptive Hypothesis		
		SUBJECT SPI	ECIF	TIC
<b>26</b> )		al $(4 \times 4)$ matrix A satisfies the equitive tity matrix. The positive Eigen value		
	A)	1	B)	2
	C)	3	D)	4
27)		XI, X2, and X3 be independent and id the uniform distribution on [0, 1]. T		<u> </u>
	A)	0.52-0.43	B)	0.32-0.34
	C)	0.45-0.46	D)	0.21-0.20

28)	When the optical power incident on a photodiode is $10\mu W$ and the responsivity is $0.8A/W$ , the photocurrent generated (in $\mu A$ ) is			
	A)	4	B)	6
	C)	9	D)	8
29)		capacity of a Binary Symmetric Chan	nel (	BSC) with cross-over probability
	A)		B)	2
	C)	4	D)	6
30)	arm	-network has resistances of $10\Omega$ each has a resistance of $11\Omega$ in the equivariance of among the three resistances is	alen	at $\Delta$ – network, the lowest value
	A)	$12.24\Omega$		
	,	$33.66\Omega$		
	,	$29.09\Omega$		
	D)	$25.05\Omega$		
31)	and	JT is biased in forward active mode, a reverse saturation current 13 S I 10 – mA/V) is		<del>-</del>
	A)	4.347	B)	3.120
	C)	5.785	D)	6.245
32)	is un A) B) C)	sider a random process $X(t) = \sqrt{2} \sin t$ iformly distributed in the interval $[0,2\pi \cos (2\pi(t_1 + t_2)) \sin (2\pi(t_1 - t_2)) \sin (2\pi(t_1 + t_2)) \cos (2\pi(t_1 - t_2))$		· · ·
33)		ir coin is tossed repeatedly until a 'Hennumber of tosses to get this first 'Hea		
	A)	1	В)	3
	C)	2	D)	4

# **M/P Ent.- 18**

A) 50 B) 40 C) 30 D) 20  35) The natural frequency of an undamped second-order system is 40 rad/s. If the system is damped with a damping ratio 0.3, the damped natural frequency is rad/s is A) 41.03 rad/s B) 38.15 rad/s C) 22.03 rad/s D) 54.27 rad/s  36) Negative feedback in a closed-loop control system DOES NOT A) reduce the overall gain B) reduce bandwidth C) improve disturbance rejection D) reduce sensitivity to parameter variation  37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspect ratio of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is A) 7 B) 6 C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The meat of the random variable is A) 2 B) 4 C) 5 D) 1	34)	The input impedance of a $\lambda/8$ section of a lossless transmission line of characteristic impedance $50\Omega$ is found to be real when the other end is terminated by a load $Z_L(=R+jX)$ $\Omega$ . if X is $30\Omega$ , the value of R (in $\Omega$ ) is				
<ul> <li>35) The natural frequency of an undamped second-order system is 40 rad/s. If the system is damped with a damping ratio 0.3, the damped natural frequency is rad/s is</li></ul>		A)	50	B)	40	
system is damped with a damping ratio 0.3, the damped natural frequency is rad/s is		C)	30	D)	20	
C) 22.03 rad/s  D) 54.27 rad/s  36) Negative feedback in a closed-loop control system DOES NOT  A) reduce the overall gain  B) reduce bandwidth  C) improve disturbance rejection  D) reduce sensitivity to parameter variation  37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspecratio of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is  A) 7  B) 6  C) 9  D) 8  38) The second moment of a Poisson-distributed random variable is 2. The mean of the random variable is  A) 2  B) 4	35)	syst	em is damped with a damping ratio		<del>_</del>	
<ul> <li>36) Negative feedback in a closed-loop control system DOES NOT  A) reduce the overall gain B) reduce bandwidth C) improve disturbance rejection D) reduce sensitivity to parameter variation</li> <li>37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspectation of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is</li></ul>		A)	41.03 rad/s	B)	38.15 rad/s	
A) reduce the overall gain B) reduce bandwidth C) improve disturbance rejection D) reduce sensitivity to parameter variation  37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspectation of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is A) 7 B) 6 C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The meatof the random variable is A) 2 B) 4		C)	22.03 rad/s	D)	54.27 rad/s	
B) reduce bandwidth C) improve disturbance rejection D) reduce sensitivity to parameter variation  37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspectation of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is A) 7 B) 6 C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The mea of the random variable is A) 2 B) 4	36)	Neg	ative feedback in a closed-loop con	trol s	ystem DOES NOT	
C) improve disturbance rejection D) reduce sensitivity to parameter variation  37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspect ratio of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is A) 7 B) 6 C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The meat of the random variable is A) 2 B) 4		A)	reduce the overall gain			
D) reduce sensitivity to parameter variation  37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspect ratio of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is  A) 7 B) 6 C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The mean of the random variable is  A) 2 B) 4		B)	reduce bandwidth			
<ul> <li>37) A 16 Kb (=16,384 bit) memory array is designed as a square with an aspect ratio of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is</li> <li>A) 7</li> <li>B) 6</li> <li>C) 9</li> <li>D) 8</li> <li>38) The second moment of a Poisson-distributed random variable is 2. The mean of the random variable is</li> <li>A) 2</li> <li>B) 4</li> </ul>		C)	improve disturbance rejection			
ratio of one (number of rows is equal to the number of columns). The minimum number of address lines needed for the row decoder is  A) 7 B) 6 C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The mean of the random variable is  A) 2 B) 4		D)	reduce sensitivity to parameter varia	ation		
C) 9 D) 8  38) The second moment of a Poisson-distributed random variable is 2. The mea of the random variable is A) 2 B) 4	37)	ratio	of one (number of rows is equal to the	e nui	mber of columns). The minimum	
<ul> <li>38) The second moment of a Poisson-distributed random variable is 2. The mea of the random variable is</li> <li>A) 2</li> <li>B) 4</li> </ul>		A)	7	B)	6	
of the random variable is A) 2 B) 4		C)	9	D)	8	
	38)			uted	random variable is 2. The mean	
C) 5 D) 1		A)	2	B)	4	
		C)	5	D)	1	

39) A digital communication system uses a repetition code for channel encoding/decoding. During transmission, each bit is repeated three times (0 is transmitted as 000, and 1 is transmitted as 111). It is assumed that the source puts out symbols independently and with equal probability. The decoder operates as follows: In a block of three received bits, if the number of zeros exceeds the number of ones, the decoder decides in favor of a 0, and if the number of one's exceeds the number of zeros, the decoder decides in favor of a 1. Assuming a binary symmetric channel with crossover probability p = 0.1, the average probability of error is \_\_\_\_\_\_.

A) 0.312

B) 0.465

C) 0.028

D) 0.315

**40**) Two lossless X-band horn antennas are separated by a distance of 200λ The amplitude reflection coefficients at the terminals of the transmitting and receiving antennas are 0.15 and 0.18, respectively. The maximum directivities of the transmitting and receiving antennas (over the isotropic antenna) are 18 dB and 22 dB, respectively. Assuming that the input power in the lossless transmission line connected to the antenna is 2 W, and that the antennas are perfectly aligned and polarization matched, the power (in mW) delivered to the load at the receiver is \_\_\_\_\_\_

A) 4

B) 5

C) 6

D) 3

41) A connection is made consisting of resistance A in series with a parallel combination of resistances B and C. Three resistors of value  $10\Omega$ ,  $5\Omega$ ,  $2\Omega$  are provided. Consider all possible permutations of the given resistors into the positions A, B, C, and identify, the configurations with maximum possible overall resistance, and also the ones with minimum possible overall resistance. The ratio of maximum to minimum values of the resistances (up to second decimal place) is \_\_\_\_\_\_

A) 2.12 to 2.16

B) 3.24 to 3.45

C) 4.56 to 4.83

D) 5.25 to 5.75

42)	mea	wo – wire transmission line termin sured on the line is 5.8. The percentage vision set is		
	A)	84.0 to 91.0		
	B)	48.0 to 51.0		
	C)	56.0 to 65.0		
	D)	70.0 to 81.0		
43)	Whi	ch of the following statements is inc	orrec	et?
	A)	Lead compensator is used to reduc	e the	settling time.
	B)	Lag compensator is used to reduce	the	steady state error.
	C)	Lead compensator may increase th	e ord	ler of a system.
	D)	Lag compensator always stabilizes	an u	nstable system.
44)	syste	transfer function of a causal LTI sy em is $x(t) = [\sin(t)/\pi t]u(t)$ , where upout $y(t)$ as $t \to \infty$ is		• •
	A)	0.45 to 0.55	B)	0.35 to 0.40
	C)	0.55 to 0.60	D)	0.35 to 0.40
<b>45</b> )	The	Miller effect in the context of a Com	mon	Emitter amplifier explains
	A)	an increase in the low-frequency cu	toff t	frequency
	B)	an increase in the high-frequency co	utoff	frequency
	C)	a decrease in the low-frequency cur	toff f	requency
	D)	a decrease in the high-frequency cu	itoff t	frequency

<b>46</b> )		sider the signal $x(t) = \cos(6\pi t) + \sin(3\pi t)$ uist sampling rate (in samples/secon		
	A)	8	B)	12
	C)	16	D)	32
47)		Newton-Raphson method is used to solving the initial guess as $x = 5$ , the solution—		- · · · · · · · · · · · · · · · · · · ·
	A)	4.2903	B)	3.2561
	C)	5.6213	D)	4.5216
48)		analog voltage in the range 0 to 8V version to 4-bit digital output. The r		-
	A)	0.50	B)	0.25
	C)	0.75	D)	0.55
<b>49</b> )		sider an air filled rectangular wavegut this waveguide, the cut-off frequenc		
	A)	6523 MHz	B)	4512 MHz
	C)	7810 MHz	D)	5478 MHz
50)		modulation scheme commonly used	d for	transmission from GSM mobile
	A)	4-QAM		
	B)	16-PSK		
	C)	Walsh-Hadamard orthogonal codes	S	
	D)	Gaussian Minimum Shift Keying (C	GMSI	K)
			D	

## **M/P Ent.- 18**

### Rough Work