उम्मीदवार इस पुस्तिका के सबसे ऊपरी सील को खोलकर पृष्ठ संख्या 2 और 3 के मध्य स्थापित OMR उत्तर शीट को निकाल लें। Candidates should open the top side of the seal of this Booklet and take out the OMR Answer Sheet placed at page no. 2 and 3.

पुस्तिक	न सं.	:
Booklet	No.	:

परीक्षा पुस्तिका शृंखला	:
Test Booklet Series	:

1

F	

अधिकतम अंक : 120

Maximum Marks : 120

SB-	EL
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परीक्षा प्रश्न-पुरितका / EXAMINATION QUESTION BOOKLET

निर्धारित समय : 180 मिनट Time Allowed : 180 Minutes					
रोल नं. Roll No. :					

ELECTRONICS

उत्तर शीट सं.: Answer Sheet No. :

प्रश्नों के उत्तर देने से पहले निम्नलिखित अनुदेशों को ध्यान से पढ़ लें।/ Read the fo	llowing instructions carefully before you begin to answer the questions.		
उम्मीदवारों के लिए अनुदेश	Instructions to the Candidates		
 प्रश्नों के उत्तर लिखना आरंभ करने से पहले आप इस पुरितका की जाँच करके सुनिश्चित कर लें कि इसमें पूरे पृष्ठ (1-20) हैं तथा कोई पृष्ठ या उसका भाग कम या दुबारा तो नहीं आ गया है। उम्मीदवारों को यह भी जाँच करनी है कि उनको केवल उस स्ट्रीम की सही परीक्षा-पुरितका मिली है जिसके लिए उन्होंने आवेदन किया है और जो उनके Admit Card में छपा है अर्थात् कंप्यूटर साइंस या सूचना प्रोद्योगिकी या इलेक्ट्रॉनिक्स। यदि आप इस पुरितका में कोई त्रुटि पाएं, तो तत्काल इसके बदले दूसरी पुरितका ले। ओएमआर उत्तर-शीट प्रश्न पुरितका में ही उपलब्ध रहेगी। कृपया सुनिश्चित करें कि ओएमआर शीट संख्या और परीक्षण पुरितका संख्या समान हैं। ओएमआर शीट पर जानकारी भरने से पहले ओएमआर शीट पर छपे निर्देशों को ध्यान से पढ़ें। आपको 	 Before you start to answer the questions you must check this booklet and ensure that it contains all the pages (1-20) and see that no page or portion thereof is missing or repeated. Candidates are also required to check that they have got the right question booklet strictly from the stream candidate has applied for and printed on the Admit Card i.e. Computer Science OR Information Technology OR Electronics. If you find any defect in this Booklet, you must get it replaced <i>immediately</i>. OMR Answer-Sheet is within the Question Booklet. Please ensure OMR Answer-Sheet number and Test Booklet No. of Question Paper are same. Read the instructions printed on OMR Answer-Sheet 		
 ओएमआर उत्तर-पत्रक पर सभी विवरणों को सही ढंग से पूरा और कोड करना होगा, ऐसा न करने पर आपकी उत्तर पुरितका का मूल्यांकन नहीं किया जा सकता है। प्रश्नों का उत्तर देना शुरू करने से पहले आपको ओएमआर उत्तर-पत्रक पर दिये गए निर्धारित स्थान पर अपने हस्ताक्षर करने होंगे। इन निर्देशों का पूर्ण रूप से पालन किया जाना चाहिए, ऐसा न करने पर आपकी औएमआर उत्तर-पुरितका का मूल्यांकन नहीं किया जा सकता है। (दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों के ओएमआर उत्तर-शीट में निर्धारित स्थान पर आपने ब्रम्धी को ओएमआर उत्तर-शीट में निर्धारित स्थान पर आपने वाएं हाथ के अंगूठे का निशान अवश्य लगाना चाहिए। इसके अतिरिक्तर, जा दृष्टिहीन उम्मीदवारों के ओएमआर उत्तर-शीट में निर्धारित स्थान पर अपने वाएं हाथ के अंगूठे का निशान अवश्य लगाना चाहिए। इसके अतिरिक्त, जा दृष्टिहीन उम्मीदवार तान प्रतियों में होंगी (मूल तथा कार्बन की दो प्रतिलिपियाँ)। परीक्षा समारि के बाद ओ.एम्.आर. की मूल शीट तथा एक कार्बन की दो प्रतिलिपि की थाएम आर. की मूल शीट तथा एक कार्बन की दो प्रतिलिपियाँ)। परीक्षा समारिक का वार ओ.एम्.आर. की मूल शीट तथा एक कार्बन की दो प्रतिलिपि निरीक्षक को सौंपने के पश्चात उम्मीदवार अपने साथ एक कार्बन प्रतिलिपि ले जा सकते/सकती हैं। यदि कोई भी उम्मीदवार ऐसा करने में असफल रहता/रहती है तो उसकी उम्मीदवारी रद्व कर दी जायेगी। यदि कोई उम्मीदवार अपनी कार्बन प्रतिलिपि में किसी भी प्रकार का फेर-बदल कर उसका दावा करता/करती है तो इस स्थिति में भी उसका/उसकी उम्मीदवारी रद्द की जायेगी। 4. इस प्रश्न पूरित्रा में 120 बहुविकल्पीय प्रश्न हैं। प्रत्वेक प्रशन क 4 विकल्प दिए जए हैं, जी स्था का स्थाय का स्था का का की 4 विकल्प दिए जए हैं, स्था का स्था की करता है। 	 carefully before filling the information on the OMR Answer-Sheet. You must complete and code all the details on the OMR answer sheet correctly failing which your answer sheet may not be evaluated. You must also put your signature on the OMR Answer-Sheet at the prescribed place before you actually start answering the questions. These instructions must be fully complied with, failing which, your OMR Answer-Sheet may not be evaluated. (For V.H. candidates these details will be filled in by the scribe. However, all V.H. candidates must put their left-hand thumb impression at the space provided in the OMR Answer-Sheet. In addition, those V.H. candidates who can sign should also put their signatures in addition to thumb impression.) 3. The OMR Answer-Sheet will be in triplicate (Original and two carbon copies). Candidate has to take one carbon copy (marked as 'candidate copy') with him/her after examination and handover the original OMR along with one carbon copy to invigilator. If candidate fails to handover the original OMR along with one carbon copy and claims for same, in that case also his/her candidature will be cancelled. 4. This booklet consists of 120 Multiple Choice Questions. Each question has 4 		
 (A), (B), (C) और (D)। किसी भी स्थिति में प्रत्येक प्रश्न का केवल एक विकल्प ही सही उत्तर है। यदि आपको एक से अधिक विकल्प सही लगें तो सबसे अधिक उचित एक विकल्प का चुनाव करें और उत्तर शीट में सम्बंधित प्रश्न के सामने वाले उपयुक्त गोले को काला करें। प्रश्न पुस्तिका में दो भाग हैं : भाग A : सामान्य (42 प्रश्न) और भाग B : तकनीकी (78 प्रश्न)। उम्मीदवार को दोनों भागों के उत्तर लिखना अनिवार्य हैं। 	 (four) alternatives (A), (B), (C) and (D). In any case only one alternative will be the correct answer. In case if you find more than one correct answer, then choose the most appropriate single option and darken the appropriate circle in the answer sheet in front of the related question. Question Booklet consists of two parts : Part A : Generic (having 42 questions) and Part B : Technical (having 78 questions). Candidates has to attempt both narts computering. 		
 प्रत्यक सहा उत्तर के लिए 1 अर्क दिया जाएगा आर प्रत्यक गलत उत्तर के लिए 0.25 अर्क काट लिया जाएगा। 	6. For each correct answer One mark will be given and for each incorrect		
 गोले को काला करने के लिए केवल काले/नीले बॉल प्वाइंट पेन का प्रयोग करें। गोले को एक बार काला करने के बाद इसको मिटाने या बदलने की अनुमति नहीं है। यदि किसी प्रश्न के सामने एक से ज्यादा गोले काले किये गए हों तो मशीन द्वारा उसके लिए शूल्य अंक दिया जाएगा। किसी भी रिथति में उत्तर शीट को न मोड़ें। उत्तर-परितका पर कोई भी रफ कार्य नहीं करना है। रफ कार्य के लिए इन्य परितका में 	 answer U.25 marks will be deducted. 7. Use Black/Blue ball point Pen to darken the circle. Answer once darkened is not allowed to be erased or altered. Against any question if more than one circle is darkened, machine will allot zero mark for that question. 8. Do not fold answer sheet in any case. 9. No rough work is to be done on the Answer-Sheet. Space for rough work has been provided in this booklet 		
स्थान दिया गया है।	10. Mobile phones and wireless communication devices are completely banned		
10. परीक्षा हॉल/कमरों में मोबाइल फ़ोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फ़ोन/किसी अन्य बेतार संचार साधन को रिवच ऑफ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जायेगा और उनके विरुद्ध कार्यवाही की जाएगी, जिसमें उनकी उम्मीदवारी रद्द करना भी शामिल है।	In the examination hall/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature.		
11. अभ्यर्थी अपनी उत्तर पुरितका पर्यवेक्षक को सौंपे बिना और अपने रोल नंबर के सामने उचित स्थान पर उपस्थिति पत्रक पर हस्ताक्षर किए बिना परीक्षा हॉल/कक्ष से बाहर नहीं जा सकता। इसके अलावा अभ्यर्थी को उपस्थिति पत्रक पर हस्ताक्षर करने से पहले यह भी सुनिश्चित करना चाहिए कि बुकलेट नंबर, बुकलेट सीरीज और ओएमआर उत्तर पुरितका संख्या सही ढंग से लिखी गई हो। ऐसा ना करने पर, ओएमआर उत्तर पुरितका को अमान्य माना जापाग/मलगंकत नहीं किया जा फरने पर, ओएमआर उत्तर पुरितका को अमान्य माना जापाग/सलगंकत नहीं किया जा फरने थे।	11. Candidate should not leave the examination hall / room without handing over his/her Answer-Sheet to the invigilator and without signing on the attendance sheet at proper place against your roll number, further candidate should also ensure that booklet no., booklet series and OMR Answer-Sheet No. are correctly written on attendance sheet before signing on it, failing in doing so, may lead to disqualification / no evaluation of OMR Answer-Sheet		
भग जनान्य माना जाएगा/मूल्याकन नहां किया जा संकता ह।	uisquainication / no evaluation of OMR Answer-Sheet.		

जब तक आपसे कहा न जाए तब तक प्रश्न-पुस्तिका न खोलें / DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

उम्मीदवार का नाम/Name of Candidate : ____

____ उम्मीदवार के हस्ताक्षर/Signature of Candidate : __

/----×

PART - A **GENERIC**

Directions (1-2) : Use following diagrams to answer question number 1 to 2 :



1. Cloud, River, Mountain :

(A)	II	(B)	Ι
(C)	IV	(D)	III

2. Oxygen, Atmosphere, Nitrogen :

(A)	11	(B)	I
(C)	IV	(D)	III

Directions (3-5) : In each of the following questions, one number is wrong in the series. Find out the wrong number.

- 3. 701, 348, 173, 85, 41, 19, 8 : (A) 173 (B) 41 (C) 19 (D) 348 4. 3, 5, 12, 39, 154, 772, 4634 :
 - (A) 5 (B) 3 (C)39
- 5. 1, 9, 25, 49, 86, 121 : (A) 25 (B) (C)
- (D) 154
 - 121 166 (D) 86
- A/Page 2

6. Rakesh is standing at a point. He walks 20 m towards the East and further 10 m towards the South, then he walks 35 m towards the West and further 5 m towards the North, then he walks 15 m towards the East. What is the straight distance in metres between his starting point and the point where he reached last?

(A)	0	(B)	5
(C)	10	(D)	15

Directions (7 - 8): In the given questions below, a statement is given followed by two conclusions numbered I and II. You have to take the statement to be true. Read both the conclusions and decide which of the two or both follow from the given statement. Give answer :

- (A) If only conclusion I follows.
- (B) If only conclusion II follows.
- (C) If either I or II follows.
- (D) If neither I nor II follows.

7. A study of planning commission reveals boom in revenues. However, this has been of little avail owing to soaring expenditure. In the event, there has been a high dose of deficit financing, leading to marked rise in prices. Large financial outlays year after year had little impact on level of living.

- Ι A boom in revenues leads to rise in prices.
- Π Large financial outlays should be avoided.
- 8. The top management has asked the four managers either to resign by tomorrow or face the order of service termination. Three of them have resigned till this very evening.
 - Ι The manager who did not resign yesterday will resign tomorrow.
 - Π The management will terminate the service of one manager.
- SPACE FOR ROUGH WORK

Directions (9-13) : Read the information given below and on the basis of the information, select the correct alternative for each question given after the information.					Dire belo seleo give	ections w an et the n afte	s (14-18) : I d on the correct alt er the info	Read the info basis of the ternative for prmation.	rmation g informa each que	given tion, stion
There are five persons P, Q, R, S and T. One is football player, one is chess player, one is hockey player. P and S are unmarried ladies and do not participate in any game. None of the ladies plays chess or football. There is a married couple in which T is the husband. Q is the brother of R				M an O an P an and	nd N nd M d N a Q are	are good are good re good at good at fe	at hockey a l at hockey a cricket and v ootball and b	nd volley and base olleyball. asketball.	vball. eball. <i>O,</i> P	
and	is neit	her a chess player	nor a	hockey player.	14.	Who gam	o among th les ?	ne following i	s good at	four
9.	Whie of la	ch of the followin dies ?	g is th	e correct group		(A)	Q	(B)	Р	
	(A)	P, Q and R	(B)	Q, R and S		(C)	0	(D)	Μ	
	(C)	P, Q and S	(D)	P, R and S		T 4 71		1	. 1	c
				15.	gam	o 15 good les ?	at the large	st numb	er of	
10.	(A)		(B)	R		(A)	Q	(B)	Р	
	(C)	S	(D) (D)	T		(C)	0	(D)	Ν	
11.	Who	o is the wife of T	?		16.	Who volle	o is good eyball?	at cricket,	baseball	and
	(A)	Q				(A)	Q	(B)	Р	
	(B)	R				(C)	О	(D)	Ν	
	(C)	S								
	(D)	None of these			17.	Who volle	o is good eyball?	at baseball,	hockey	and
12.	Who	is the hockey pl	ayer ?			(A)	Q	(B)	Р	
	(A)	Т	(B)	S		(C)	0	(D)	М	
	(C)	R	(D)	Q						
13.	13. Who is the football player ?			2	18.	Who hock	o is good key ?	at cricket, v	olleyball	and
	(A)	Q	(B)	R		(A)	Q	(B)	Р	
	(C)	S	(D)	Т		(C)	0	(D)	Ν	
$\overline{\mathbf{A}/\mathbf{P}}$	age 3			SPACE FOR R	OUGI	H WC	ORK		S	B-EL

Directions (19-21): Read the information given below and on the basis of the information, select the correct alternative for each question given after the information.

- Six flats on a floor in two rows facing (i) North and South are allotted to P, Q, R, S, T and U.
- Q gets a north facing flat and is not next (ii) to S.
- S and U get diagonally opposite flats. (iii)
- R next to U, gets a south facing flat and T (iv) gets a north facing flat.
- 19. If the flats of T and P are interchanged, who's flat will be next to that of U?

(A)	Q	(B)	Т
(C)	Р	(D)	R

20. Whose flat is between Q and S?

(A)	Т	(B)	U
(C)	R	(D)	Р

21. The flats of which of the other pairs than SU, is diagonally opposite to each other ?

(A)	PT	(B)	PQ
(C)	QR	(D)	TS

- 22. In a fraction, numerator is increased by 25% and the denominator is diminished by 10%. The new fraction obtained is 5/9. The original fraction is :
 - (A) 2/5
 - 5/9(B)
 - (C)

(D)

A/Page 4

- If x = p, y = q then which of following are 23. p and q respectively for pair of equations 3x - 7y + 10 = 0 and y - 2x - 3 = 0:
 - (A) −1, 1 1, 1 (B)

(C) 1, 0 (D) 0, 1

24. A cylindrical vessel 60 cm in diameter is partially filled with water. A sphere 30 cm in a diameter is dropped into it. The increase in the level of water in the vessel is:

> 3 cm (A) 2 cm (B)

(C)4 cm(D) 5 cm

25. A, B and C rented a pasture by paying ₹ 2160 per month. They put 60, 40 and 20 sheep respectively. A sells 1/3 of his sheep to B after 6 months and after 3 months more C sells 2/5 of his sheep to A. Find the rent paid by C at the end of the year :

> (A) ₹ 4355 ₹ 3888 (B)

- ₹ 2464 (D) ₹ 6224 (C)
- Instead of walking along two adjacent 26. sides of a rectangular field, a boy took a short cut along the diagonal and saved a distance equal to half the longer side. Then, the ratio of the shorter side to the longer side is :

3/5	(A) 1/2	(B) 2/3
None of the above	(C) 1/4	(D) 3/4

SPACE FOR ROUGH WORK

- **27.** In a parallelogram ABCD, AP and BP are the angle bisectors of \angle DAB and \angle ABC. Find \angle APB :
 - (A) 85° (B) 90°
 - (C) 94° (D) 86°
- **28.** $\frac{1}{2} \log_{10} 25 2 \log_{10} 3 + \log_{10} 18$ equals :
 - (A) 18
 - (B) 1
 - (C) $\log_{10} 3$
 - (D) None of these
- **29.** A cuboid of dimension 24 cm×9 cm×8 cm is melted and smaller cubes of side 3 cm are formed. Find how many such cubes can be formed :
 - (A) 27 (B) 64
 - (C) 54 (D) 32
- 30. A factory employs skilled workers, unskilled workers and clerks in the proportion 8 : 5 : 1, and the wages of a skilled worker, an unskilled worker and a clerk are in the ratio 5 : 2 : 3. When 20 unskilled workers are employed, the total daily wages of all (skilled workers, unskilled workers and clerks) amount to ₹ 318. The wages paid to each category of workers are :

(A) ₹ 240, ₹ 60, ₹ 18

(B) ₹ 200, ₹ 90, ₹ 28

(C) ₹ 150, ₹ 108, ₹ 60

(D) ₹ 250, ₹ 50, ₹ 18

31. In a mixture of 60 L, the ratio of milk and water is 2 : 1. If the ratio of milk and water is to be 1 : 2, then the amount of water to be further added must be :
(A) 40 L
(B) 30 L
(C) 20 L
(D) 60 L

32.	The students in a class are seated
	according to their marks in the previous
	examination. Once it so happens that four
	of these students get equal marks and
	therefore the same rank. To decide their
	seating arrangement, the teacher wants to
	write down all possible arrangements, one
	in each of separate bits of paper, in order
	to choose one of these by lots. How many
	bits of paper are required ?

(A)	9	(B)	12
(C)	15	(D)	24

Directions (33-34) : Read the information given below and on the basis of the information, select the correct alternative for each question given after the information.

<u> </u>	DU			IDDAN			METROF		
VEAR	KUI	KAL	SEMI-U	RBAN STATE CAPITAL			MEIROPOLITAN		
ILAN	Арр	Pass	Арр	Pass	Арр	Pass	Арр	Pass	
2015	1652	208	7894	2513	5054	1468	9538	3214	
2016	1839	317	8562	2933	7164	3248	10158	4018	
2017	2153	932	8139	2468	8258	3159	9695	3038	
2018	5032	1798	9432	3528	8529	3628	11247	5158	
2019	4915	1668	9784	4015	9015	4311	12518	6328	
2020	5628	2392	9969	4263	10725	4526	13624	6449	

*App - Appeared *Pass - Passed

33. In which of the following years was the percentage passed to appeared candidates from semi-urban area the least ?

(A)	2015	(B)	2016
(C)	2017	(D)	2018

34. What approximate value was the percentage drop in the number of semi-urban candidates appeared from 2016 to 2017 ?

(A)	15	(B)	10
(C)	5	(D)	8

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A/P	age 6			SPACE FOR R	OUG	H WC	ORK		SB-EL
	(D)	be satisfied				(C)	to whom	(D)	to that
	(C)	make somethin	g fail			(A)	whom	(B)	to which
	(B)	suspect someth	ing			by ti	ne govi.		
	(A)	remain faithful	to the	cause		victi	ms owed their l	ives, w	vere rewarded
38.	Stick	to once guns :			42.	The	fisherman.		the flood
	(D)	Treat lightly				(D)	principal, prin	cipal	
	(C)	Ridicule	0			(C)	principle, princ	ciple	
	(B)	Talk about sho	pping			(В)	principal, principal	ciple	
	(A)	Talk about once	e profe	ession		(P)	· · · · ·	· 1	
37.	Talk	shop :				(A)	principle, prin	cipal	
Each idioi Choo	n of natic ose th	these question expression follow are one closest to	ns (35 wed by its me	7-38) has an y four options. eaning.	41.	"Go han task in th	ing by the ds make light involved ." The words that he above sentenc	work all the at best e are :	that many ;, the school students in the fill the blanks
	(D)	complemented,	comp	limented					
	(C)	complimented,	compl	limented		(C)	harmful	(D)	graduating
	(B)	complimented,	compl	lemented		(A)	delaying	(B)	glorious
	appe blan (A)	ks in the above s complemented,	ords tr entenc comp	at best fill the e are : lemented	40.	close DEL	est in meaning ETERIOUS	to the	word below ?
36.	"The she	e dress immediately	hin	n so well that him on his	10	¥471 ·			<i></i>
	(C)	but even	(D)	rather than		(C)	Mangaeble	(D)	Managible
	(A)	rather	(B)	but also		(A)	Managable	(B)	Manageable
35.	He 	was not only of consp	accu piracy.	sed of theft	39.	Iden opti	tify the correct sp ons:	elling o	out of the given

PART - B

TECHNICAL

43. The content of register A after executing the following code is :

MOV A, #35H

ANL A, #0F H

- (A) A = 0F H (B) A = 20 H
- (C) A = 35 H (D) A = 05 H
- **44.** The transistor in the circuit shown has a maximum I_{CBO} specified at 10 µA and a beta of 180. ______ value of collector resistor (R_C) which will ensure that the collector voltage does not drop below 8 V with the base open circuited.



(C) 10 K (

SPACE FOR ROUGH WORK

SB-EL

45. The transistor shown in the circuit is in $\frac{1}{V_A=0.95}$ V, $V_B=0.95$ V.



- (A) Inverted
- (B) Cut off
- (C) Active
- (D) None of the options
- **46.** The Boolean function realized by the logic circuit shown is :



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47. The black box shown in the circuit contains resistors and independent sources. For $R=0 \Omega$ and 2Ω , the value of current I is 3 A and 1.5 A, respectively. The value of I for $R=1 \Omega$ would be :



48. In the circuit given below the value of R_{L'} for maximum power dissipation across it, will be :



- (A) 15.8
- (B) 11
- (C) 5
- (D) 6
- **49.** Which one of the following represents the flags in the 8085 microprocessor ?
 - (A) S, Z, AC, P, CY
 - (B) S, OV, AC, P, CY
 - (C) S, Z, OV, P, CY
 - (D) S, Z, AC, P, OV
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- 50. The integral $\int_{0}^{1} \frac{(x^{p} + x^{-p})\log(1+x)}{x} dx$ converges if : (A) -1(B) <math>1(C) <math>-2(D) <math>p = 3
- **51.** Using Newton-Raphson method, the iterative formula to compute *k*th root of a natural number *N* is :

(A)
$$x_{n+1} = \frac{1}{k} \left[(k-1)x_n + \frac{N}{x_n^{k-1}} \right]$$

(B)
$$x_{n+1} = (k-1)x_n + \frac{N}{x_n^{k-1}}$$

(C)
$$x_{n+1} = \frac{1}{k} \left[(k+1)x_n + \frac{N}{x_n^{k-1}} \right]$$

(D) $x_{n+1} = \frac{1}{k} \left[(2k-1)x_n + \frac{N}{x_n^k} \right]$

52. The circuit shown below is a _____ counter.



- (A) Modulo 7
- (B) Modulo 6
- (C) Modulo 5
- (D) Modulo 15

53. If
$$\overrightarrow{E} = \omega \left(\stackrel{\wedge}{a_x} + 2j \stackrel{\wedge}{a_y} \right) e^{-j(\omega t - kz)}$$
 and
 $\overrightarrow{H} = \mu \left(\stackrel{\wedge}{4a_y} - 2j \stackrel{\wedge}{a_x} \right) e^{-j(\omega t - kz)}$, the time
averaged poynting vector is :
(A) zero vector
(B) $\frac{\omega \mu}{2} \stackrel{\wedge}{a_z}$
(C) $\frac{2}{\omega \mu} \stackrel{\wedge}{a_z}$
(D) $(\omega^2 + \mu^2) \stackrel{\wedge}{a_z}$

54. The input to the circuit is $v_i = 2\sin(2t)$ mV. The current i_o is :



- (D) 0
- **55.** A CPU has 24-bit instructions. A program starts at address 300 (in decimal). Which of the following is a legal program counter (all values in decimal) ?

(A)	400	(B)	500
(C)	600	(D)	700

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- 56. The output of a linear time invariant system to a unit step input is $t^2e^{-2t}u(t)$. The system transfer function H(s) will be :
 - (A) $s/[s^2(s+2)]$ (B) $2/(s+2)^2$ (C) $2/(s+2)^3$ (D) $2s/(s+2)^3$
- **57.** A binary source is emitting a data of 100 kbps. The bandwidth required to transmit this data by using 256-ary PSK modulation is :
 - (A) 25 kHz
 (B) 50 kHz
 (C) 75 kHz
 (D) 12.5 kHz
- **58.** If the gain (V_o/V_{in}) for the circuit given below is = -12, the value of *R* (in k Ω) is :



59. A RAM chip has a capacity of 1024 words of 8 bits each $(1K \times 8)$. The number of 2×4 decoders with enable line needed to construct a $16K \times 16$ RAM from $1K \times 8$ RAM is :

(A)	4	(B)	5
(C)	6	(D)	7

SPACE FOR ROUGH WORK

- **60.** If P(A) = a, P(B) = b, then :
 - (A) $aP(A/B) \ge a+b-1$
 - (B) $aP(A/B) \le a+b$
 - (C) $bP(A/B) \ge a+b-1$
 - (D) $bP(A/B) \le a+b$
- **61.** HLT opcode means :
 - (A) Load data to H register
 - (B) Store result in memory
 - (C) Transfer data from Accumulator to H register
 - (D) End of program
- 62. Assuming $V_{CEsat} = 0.2$ V and $\beta = 50$, the minimum base current (I_B) required to drive the transistor in the saturation is :



- (A) 56 μA
- (B) 140 µA
- (C) 60 mA
- (D) 3 μA
- **63.** If *A*, *B* and *C* in order toss a coin. The first one to throw a head wins. What is the chance of *B*'s winning assume that the game may continue infinitely ?
 - (A) 2/7
 (B) 1/7
 (C) 4/7
 (D) 3/7
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- 64. A rectangular metal waveguide filled with a dielectric material of relative permittivity $\varepsilon_r = 4$ has the inside dimensions 3.0 *cm* × 1.2 *cm*. The cut off frequency for the dominant mode is : (A) 2.5 GHz (B) 5.0 GHz
 - (C) 10.0 GHz (D) 12.5 GHz
- 65. Refractive index of glass is 1.5. Find the wavelength of a beam of light with a frequency of 10^{14} Hz in glass. Assume velocity of light 3×10^8 m/s in vacuum.
 - (A) 4 μm
 - (B) 3 μm
 - (C) 2 μm
 - (D) 1 μm
- **66.** 0D0H, 99H, 98H, 88H, 87H is the address of :
 - (A) TCON, PCON, SCON, SBUF, PSW
 - (B) PSW, TCON, SCON, SBUF, PCON
 - (C) PCON, PSW, TCON, SCON, SBUF
 - (D) PSW, SBUF, SCON, TCON, PCON
- **67.** The signal $x(t) = \frac{1}{n} \{r(ut + v)\}$ shown below, where u, v and n are constant and r(t) is the unit ramp function. The value of (u, v, n) is :



- **68.** In DPSK technique, the technique used to encode bits is :
 - (A) AMI
 - (B) Differential code
 - (C) Unipolar RZ format
 - (D) Manchester format
- **69.** For a (7, 4) block code, 7 is the total number of bits and 4 is the number of :
 - (A) Information bits
 - (B) Redundant bits
 - (C) Total bits information bits
 - (D) None of the above
- **70.** Let 15 signals each bandlimited to 2 kHz are to be transmitted over a single channel by frequency division multiplexing. If SSB-SC modulation is used and a guard band of 1 kHz is used then the bandwidth of multiplexed signal be :

(A)	30 kHz	(B)	44 kHz
(C)	35 kHz	(D)	60 kHz

- 71. An AM signal $x(t) = [5 + 2\cos(2000 \pi t)]\cos(20000\pi t)$ has frequency components :
 - (A) 500 Hz, 9.5 kHz and 10.5 kHz
 - (B) 10 kHz, 9 kHz and 11 kHz
 - (C) 20 kHz, 18 kHz and 22 kHz
 - (D) 10 kHz, 8 kHz and 12 kHz
- **72.** The total number of feedback loops in the graph shown below is :



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- **73.** Find the Poynting power of an EM wave, given that the cross product of the E and H* component is 2+3j.
 - (A) 2 (B) 1
 - (C) 4 (D) 8
- **74.** If the circuit requires a trigger pulse width less than the output pulse width, then the duty cycle of the circuit is limited to .



75. If $V_1 = 1.65$ Volts is applied in the circuit shown below. The value of current I_2 is : All diodes are Si diode.



SPACE FOR ROUGH WORK

76. The integral
$$\int_{-\infty}^{\infty} \frac{dx}{(x^2 + 1)^3}$$
 equals to:
(A) $\frac{\pi}{8}$ (B) $\frac{3\pi}{8}$
(C) $\frac{7\pi}{8}$ (D) 1

- 77. If the system of simultaneous linear equations x + 2y + 3z = 6, x + 3y + 5z = 9, 2x + 5y + az = b is consistent and has infinitely many solutions, then :
 - (A) $a=8, b \in R$ (real numbers)
 - (B) b = 15, $a \in R$ (real numbers)
 - (C) $a \in R, b \in R$
 - (D) a = 8, b = 15
- **78.** The Fourier transform of following signal is :
 - $x(t) = e^{-\frac{z}{3}|t|}$ (A) $\frac{3}{4+9\omega^2}$ (B) $\frac{12}{4+9\omega^2}$ (C) $\frac{12}{9+4\omega^2}$ (D) $\frac{9}{9-4\omega^2}$
- **79.** For a microprocessor which is capable of addressing 64 kbytes of the memory, the address bus width will be _____.
 - (A) 20(B) 8(C) 12(D) 16
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80. The transmission parameter B (also known as ABCD Parameter) for the network shown below is :



81. Binary data is transmitted using polar RC pulses with spectrum shown below. The roll of factor is ______.



- 82. Three memory chips of size 4KB, 16KB and 32KB, having address bus of 12 bits.
 ______ are the size of data bus on the chips.
 - (A) 8 bits, 8 bits and 8 bits respectively
 - (B) 16 bits, 64 bits and 128 bits respectively
 - (C) 8 bits, 32 bits and 64 bits respectively
 - (D) 8 bits, 64 bits and 128 bits respectively

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- **83.** The gain margin for the system with open loop transfer function $G(s)H(s) = 2(1+s)/s^2$ is :
 - (A) ∞ (B) 0
 - (C) 1 (D) -
- 84. The lowest frequency $f_{\rm L}$ at which the energy spectral density of rect $\left(\frac{t}{T}\right)$ become zero is :
 - (A) $\frac{1}{T}$ (B) $\frac{\pi}{T}$
 - (C) $\frac{1}{\pi T}$ (D) $\frac{2}{\pi T}$
- **85.** The power supplied by dependent source in the circuit shown below will be ______.



(A) -2 kW (B) -4.3 kW(C) 2 kW (D) 4.5 kW

()

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86. Z-parameter of two port network shown below is :



- 87. If the beam width of the antenna is decreased, its side lobe level will :
 - (A) increase
 - (B) decrease
 - (C) remain constant
 - (D) None of these

88. Voltage standing wave pattern in a lossless transmission line with a characteristic impedance of 30 ohm and a resistive load is shown in the figure. The coefficient of reflection is :



89. The Fourier cosine transform of $f(x) = \begin{cases} 1: If \ 0 < x < 1\\ 0: If \ x > 1 \end{cases}$ is:

(A)
$$\frac{\sin s}{s}$$

(B) $\frac{\cos s}{s}$
(C) $\frac{1 - \cos s}{s}$
(D) $\sin s$

90. In the circuit given below, the switch is opened at t = 0. The current through capacitor at $t(0^+)$ is :



91. In the H-plane, two identical and parallel dipole antennas are kept separate by a distance of $\lambda/4$. They are loaded with equal currents, but the right antenna has a phase shift of $+90^{\circ}$. The correct pattern of radiation is given as :



92. An electromagnetic transverse wave with a circular polarization is received by a dipole antenna. Due to the polarization mismatch, the power transfer efficiency (in percent) from the wave to the antenna is reduced to approximately :

(C) 33.3 (D) 100

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93. A 4-bit right shift register is initialized to value 1000 for $(Q_3 Q_2 Q_1 Q_0)$. The *D* input is derived from Q_0 , Q_2 and Q_3 through two XOR gates as shown below. The value at *D* after 3 clock pulse is :



- (A) 0
- (B) 1
- (C) can't determine since data insufficient
- (D) None of the options
- **94.** After the execution of instruction 'MOV A, #36H' is followed by the instruction 'RR' 354 times, the content of A is ______.
 - (A) D8H (B) 6CH
 - (C) 8DH (D) C6H
- **95.** A carrier signal $V_c = 5\cos(200\pi t)$, simultaneously modulates three message signals given as :
 - $V_{m1} = 5 \cos(20 \pi t)$ $V_{m2} = 10 \cos(20 \pi t)$
 - $V_{m3} = 10 \sin(20 \pi t)$

Find the overall modulation index.

- (A) 1
 (B) 2
 (C) 3
 (D) 5
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- **96.** Compared to PN junction with $N_A = N_D = 10^{14} \text{ cm}^{-3}$, which one of the following statements is true for a PN junction with $N_A = N_D = 10^{20} \text{ cm}^{-3}$?
 - (A) Reverse breakdown voltage is lower and depletion capacitance is lower.
 - (B) Reverse breakdown voltage is higher and depletion capacitance is lower.
 - (C) Reverse breakdown voltage is lower and depletion capacitance is higher.
 - (D) Reverse breakdown voltage is higher and depletion capacitance is higher.
- 97. _____ is a logical function that represents the action of the circuit shown.



- (B) (A+B)'+(C+D)
- (C) A' + B' + C' + D
- (D) A'B'(C'+D')

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98. The current $i_{\rm R}$ in the circuit shown below for t > 0 is correctly expressed as ______, if $i_{\rm L}(0^-) = 6A$ and $V_{\rm c}(0^+) = 0$ V. The configuration of the circuit prior to t = 0 is not known.



- (A) 2.437 $(e^{-7.823 \times 10^{10} t} e^{-0.511 \times 10^{10} t})$ A
- (B) 2.437 $(e^{-7.823 \times 10^{10} t} + e^{-0.511} \times 10^{10} t) A$
- (C) $1 + 2.437 (e^{-7.823 \times 10^{10} t} e^{-0.511 \times 10^{10} t}) A$

(D)
$$2.437e^{-7.823 \times 10^{10}t}$$
 A

- **99.** The situation wherein the data of operands are not available is called ______.
 - (A) Data hazard
 - (B) Stock
 - (C) Deadlock
 - (D) Structural hazard
- **100.** The control system with derivative feedback which is shown below is stable if



- **101.** Autocorrelation of AWGN noise is correctly represented as :
 - (A) Sinc function
 - (B) Ramp function
 - (C) Triangular function
 - (D) None of the options
- **102.** For a rectangular waveguide of internal dimensions $a \times b$ (a > b), the cut off frequency for the TE11 mode is the arithmetic mean of the cut off frequencies for TE10 mode and TE20 mode. If

 $a = \sqrt{5}$ cm, the value of b (in cm) is

- (A)
 2
 (B)
 1.5

 (C)
 1
 (D)
 1.2
- **103.** What does the following program do ? MOV A, 85H
 - CPL A
 - INC A
 - (A) ANDing the content of A
 - (B) Complementing the content of A
 - (C) Logical OR of Register A
 - (D) Taking 2's complement of the content of A Register

104. Match the following :

	(a)	TCON	(i)	contains status		
				information		
	(b)	SBUF	(ii)	timer / counter		
				control register		
	(c)	TMOD	(iii)	idle bit, power		
				down bit		
	(d)	PSW	(iv)	serial data buffer		
				for Tx and Rx		
	(e)	PCON	(v)	timer/ counter		
				modes of operation		
A) ((a) - (v	7), (b) - (iii),	(c) - (ii), (d) - (i), (e) - (iv)		
B) (a) - (ii	i), (b) - (ii),	(c) - (i), (d) - (v), (e) - (iv)		
C) (C) (a) - (ii), (b) - (iv), (c) -(v), (d) - (i), (e) - (iii)					
D) (D) (a) - (i), (b) - (v), (c) - (iv), (d) - (iii), (e) -(ii)					
			-, (// (· / (· · / (· · / (· · / (· · · / (· / (· · / (/)))))))))))		
CI	IMO	DV				

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microprocessor have ?

105. The transfer function whose magnitude | 107. How many address lines can an 8-bit plot shown below is

- **110.** The Early effect in active mode of operation of transistor is referred to the phenomenon of
 - Thermal runaway because of (A) thermal breakdown in forward bias base emitter junction.
 - Zener breakdown in the reverse bias (B) of base collector junction.
 - Decrease in Effective base width in (C)reverse bias of base collector junction.
 - Avalanche breakdown in forward (D) bias of base emitter junction.

111. The particular integral of

$$(D^2 + a^2)y = \sin ax$$
 is : $\left(\text{Here, } D \equiv \frac{d}{dx}\right)$
(A) $\frac{-x}{2a} \cos ax$
(B) $\frac{x}{2a} \cos ax$

(C)
$$\frac{-x}{2a} sinax$$

(D) $\frac{x}{2a} sinax$

2a

112. Which of the following is correct ?

(A) $\frac{2}{\pi} > \frac{\sin x}{x} < 1: 0 < x < \frac{\pi}{2}$

(B) $\frac{2}{\pi} > \frac{\sin x}{x} > 1: 0 < x < \frac{\pi}{2}$

(C) $\frac{2}{\pi} < \frac{\sin x}{x} < 1: 0 < x < \frac{\pi}{2}$

(D) $\frac{2}{\pi} < \frac{\sin x}{x} > 1: 0 < x < \frac{\pi}{2}$

113. The signal *x*(t) shown below is correctly represented in terms of ramp function r(t) as :



(D) None of the above

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116. The 50 ohm load is connected in shunt in the $Z_0 = 50$ ohms two-wire transmission line as shown below. The two-port scattering parameter matrix (S-matrix) of the shunt element :



(A)
$$\begin{bmatrix} \frac{1}{3} & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{3} \end{bmatrix}$$
 (B) $\begin{bmatrix} \frac{-1}{3} & \frac{2}{3} \\ \frac{2}{3} & \frac{-1}{3} \end{bmatrix}$

(C)
$$\begin{bmatrix} \frac{2}{3} & \frac{1}{4} \\ \frac{1}{4} & \frac{2}{3} \end{bmatrix}$$
 (D) $\begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{4} & \frac{1}{2} \end{bmatrix}$

117. Consider the following :

- 1. Quantization
- 2. Sampling
- 3. Encoding
- 4. Low-pass filter

The correct sequence for converting a low-pass analog signal to digital signal is :

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

118. A 32 KB RW memory chip have separate address lines, data lines and chip enable signal. ______ is the total number of pins available on IC chip.

(A)	22		(B)	24

- (C) 25 (D) 40
- **119.** In the signal flow graph shown below, the transfer function is :



120. A square wave with peak values of ± 5 V is used as the input v_{in} to an op amp circuit, whose gain is unity. The value of SR (Slew Rate) is 0.25 (V/µs). _________ is the time for the output to rise from point A to point B.



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