ACE
Engineering Academy

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ESE- 2018 (Prelims) - Offline Test Series **Test- 11**

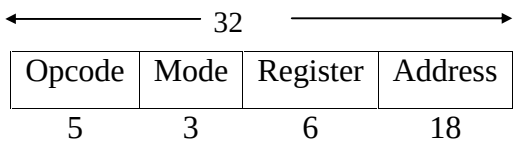
ELECTRONICS & TELECOMMUNICATION ENGINEERING

SUBJECT: COMPUTER ORGANIZATION AND ARCHITECTURE + ADVANCED COMMUNICATION + ADVANCED ELECTRONICS

SOLUTIONS

01. Ans: (b)

Sol:



02. Ans: (b)

Sol: 1206 Byte is available in 75^{th} Block

16)1206(75

112

86

80

06

Expression is K Mod C

75 Mod 64 = 11

03. Ans: (d)

Sol: Six processes arrive per minute

Each process requires 8 sec of Service Time (S.T.)

$6 \times 8 = 48$ sec

CPU is busy for 48 sec out of 60 sec

$$\% \text{ CPU utilization} = \frac{48}{60} = \frac{4}{5} = 0.8 = 80\%$$

04. Ans: (a)

Sol: 512 MB with Row size of 32 bits is 128 M × 32 bits

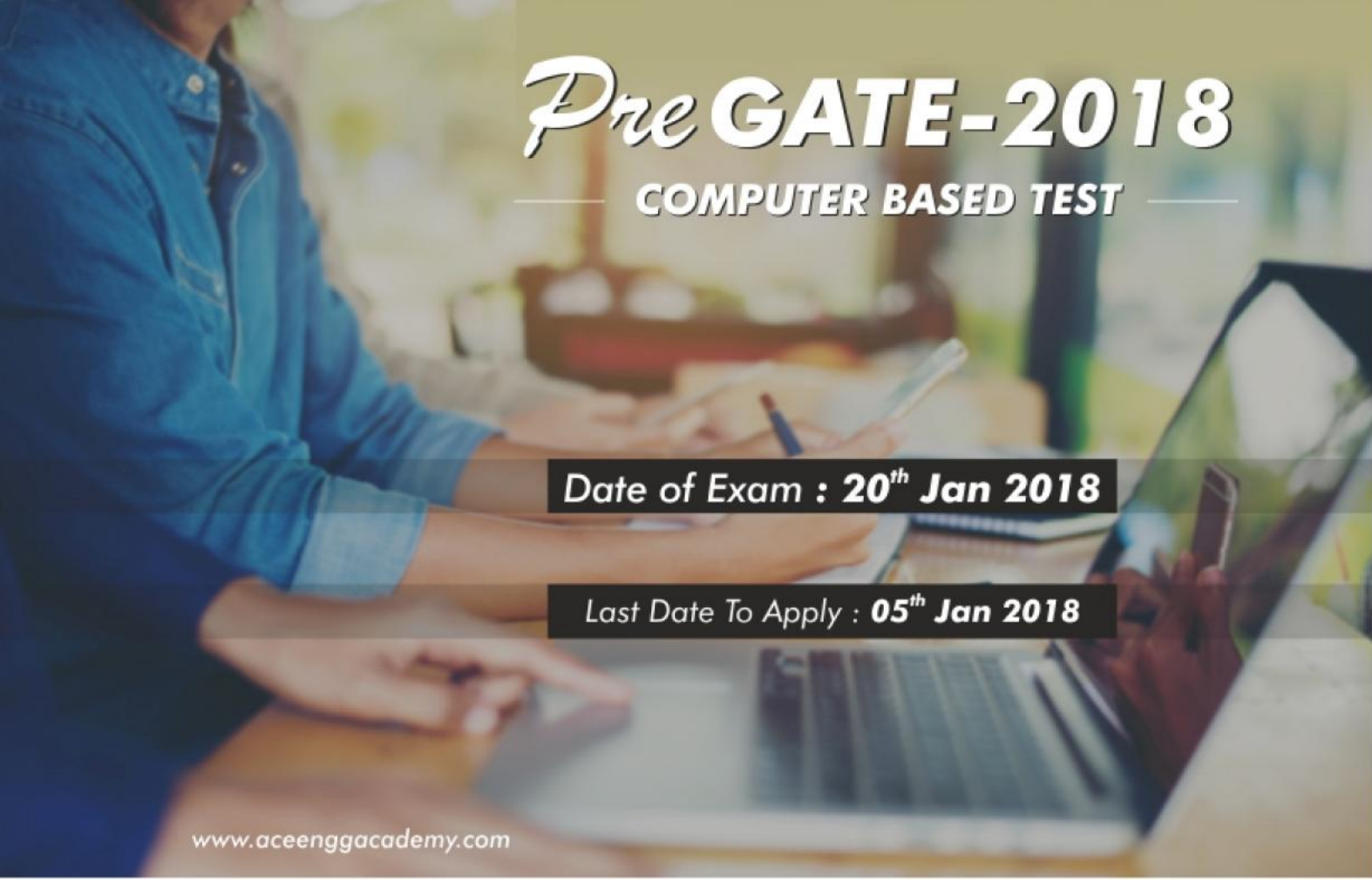
- Number of Rows: 128×10^6

Total time for all Rows is $128 \times 10^6 \times 10^{-9}$ sec = 128 ms

05. Ans: (a)

Sol: Average time = T_s + time for half revolution + time to read a sector is

$$T_a = T_s + \frac{1}{2R} + \frac{N_S}{N_t} \times \frac{1}{R}$$



06. Ans: (a)

Sol: Address field in the instruction is used to specify Memory Address or one of the processor Register Address.

For example to specify R_5 in a processor which is having 16 Registers from R_0 to R_{15}, it's Address field is '0101', and for implied Register; no address is specified in the instruction.

07. Ans : (c)

08. Ans: (a)

Sol: AC is a key and AD → B is a transitive dependency.

09. Ans: (a)

Sol: Before compilation, some sort of processing is carried out known as pre-processing. In pre-processing stage, all macro calls are substituted with their corresponding macro body.

S = 5+1*5+1;

S = 11

10. Ans: (a)

Sol: In paging, process pages can be stored anywhere in the memory.

Page table is usually stored in memory in the form of pages.

11. Ans: (c)

Sol: Precedence graph for the schedule is $T_1 \rightarrow T_2$.

12. Ans: (b)

Sol: OS keeps 1 page table entry for each page in page table.

13. Ans: (b)

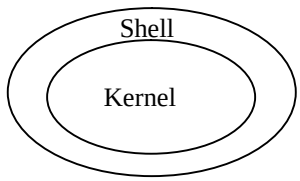
Sol: Optimal page replacement policy gives minimum page faults.

14. Ans: (b)

Sol: Interrupts are not allowed in non-preemptive multiprogramming. Number of processes in main memory is known as degree of multiprogramming.

15. Ans: (d)

Sol: GUI is the part of shell in OS.



16. Ans: (d)

Sol: Transaction T_3 performs read on A, which is updated by T_1 and committed before T_1 does.

17. Ans: (d)

Sol: In paging $\Rightarrow$ Page table

In segmentation $\Rightarrow$ Segment table

For particular implementation either of these two is used

18. Ans: (c)

Sol: Disk scheduler is a part of I/O subsystem of OS.

19. Ans: (a)

Sol: In one folder two files of same type cannot have same name.

20. Ans: (c)

Sol: In fixed or variable partition allocation degree of multiprogramming is restricted by number of partitions.

21. Ans: (a)

Sol: $\frac{nh}{nh+m}\times 100$

n = 5, m = 1000, h = 10.

$$=\frac{5\times 10}{50+1000}\times 100$$

$$=\frac{50\times 100}{1050}=4.76\%$$

22. Ans: (b)

23. Ans: (c)

Sol: e = 5, p = 7, q = 17

z = 6 × 16 = 96

(e × d) = 1 mod z = e = 5

(e × d) = multiple of 96 + 1

i = 1 96 × 1 + 1 = 97% 96 = 1

e × d = 97;d = 97/5 = fraction

i = 2 96 × 2 = 192 + 1 = 193

e × d = 193 fraction

i = 3 96 × 3 = 288 + 1 = 289

e × d = 289 fraction

i = 4 96 × 4 = 384 384 + 1 = 385

e × d = 385 $d=\frac{385}{5}=77$

24. Ans: (a)

Sol: x = 100000 bits

p = 1000 bits

b = 50 kbps

d = 250 ms per hop

k = 3

$$\text{Delay} = \frac{x}{b} + kd + (k-1)\frac{p}{b}$$

= 2000 + 3(250) + (3 – 1)20

= 2790 ms

25. Ans: (c)

Sol: T_1 carrier

Bit rate

$$= \frac{24 \times (7\,\text{bits} + 1\,\text{parity bit}) + 1\,\text{sync.bit}}{\text{One sample time} = 125\,\mu\text{s}}$$

$$= \frac{24 \times 8 + 1}{125\,\mu\text{s}} = \frac{193}{125} = 1.544\,\text{Mbps}$$

26. Ans: (a)

Sol: TCP 65515 B MSS

IP 65535 MTU

27. Ans: (c)

28. Ans: (d)

29. Ans: (a)

30. Ans: (d)

Sol: Total number of modes

$$M = \frac{\alpha}{\alpha+2}\frac{V^2}{2}$$

$$M = \frac{1}{2}\frac{\alpha}{\alpha+2}\left(\frac{2\pi a}{\lambda}NA\right)^2$$

Total number of modes depends on core radius (a), wavelength of the optical source(λ) and refractive index profile(α).

So, Ans is d

31. Ans: (c)

Sol: The FOM of an earth station in satellite communication system is primarily depends on G/T ratio

32. Ans: (b)

Sol: Given that

$$\left(\frac{S}{N}\right)_1 = \left(\frac{S}{N}\right)_2 = 60dB = 10^6$$

$$\left(\frac{S}{N}\right)_1 = 40dB = 10^4$$

$$\text{overall}\left(\frac{S}{N}\right) \text{ is}$$

$$\frac{1}{\left(\frac{S}{N}\right)_{OV}} = \frac{1}{\left(\frac{S}{N}\right)_1} + \frac{1}{\left(\frac{S}{N}\right)_2} + \frac{1}{\left(\frac{S}{N}\right)_3}$$

$$\frac{1}{\left(\frac{S}{N}\right)_{OV}} = \frac{1}{10^6} + \frac{1}{10^6} + \frac{1}{10^4}$$

$$\left(\frac{S}{N}\right)_{OV} = \frac{1}{2\times10^{-6}+10^{-4}} = \frac{1}{0.000102}$$

$$\left(\frac{S}{N}\right)_{OV} = 9803.92$$

$$\left(\frac{S}{N}\right)_{OV} = 39.91dB$$

$$\left(\frac{S}{N}\right)_{OV} \cong 40dB$$

33. Ans: (a)

Sol: We know that radar range is directly proportional to square root of the aperture area

$$R\alpha\sqrt{A}$$

$$\frac{R_2}{R_1} = \sqrt{\frac{A_2}{A_1}}$$

Since the aperture of the radar antenna is doubled so $A_2 = 2A_1$

$$\frac{R_2}{R_1} = \sqrt{\frac{2A_1}{A_1}}$$

$R_2 = \sqrt{2}\,R_1$

34. Ans: (d)

Sol: Doppler effect is used to find out the target velocity which is used in both CW radar and MTI radar.

35. Ans: (d)

Sol: $P_R\alpha\frac{1}{d^4}$

$$\frac{P_{R2}}{P_{R1}} = \frac{d_1^4}{d_2^4} = \frac{d^4}{\left(\frac{d}{2}\right)^4} = 16$$

$P_{R2} = 16\,P_{R1}$

36. Ans: (c)

37. Ans: (a)

38. Ans: (c)

Sol: It is a method of transmission and reception used to minimize the effects of selective fading of the horizontal and vertical components of a radio signal.

39. Ans: (c)

Sol: Duplexer is used to enable the common antenna for transmission and reception as well as to protect the receiver when high power signal is transmitted

40. Ans: (c)

Sol: Gain of the Dish antenna is

$$G = k\pi^2\left(\frac{D}{\lambda}\right)^2$$,where D = Diameter

$$G \propto D^2$$

$$\frac{G_2}{G_1} = \left(\frac{D_2}{D_1}\right)^2$$

$$G_2 = G_1\left(\frac{D_2}{D_1}\right)^2$$

Given $G_1 = 30dB = 10^3$, $D_2 = 10m$, $D_1 = 1m$

$$G_2 = 10^3\left(\frac{10}{1}\right)^2 = 10^5 = 50dB$$

41. Ans: (a)

Sol: The relation between f_{muf} and f_c is

$f_{muf} = f_c \sec\phi$

$f_{muf} = f_c \sec 60^0 = 2f_c$

42. Ans:(d)

Sol: In GSM total bandwidth is divided into 200kHz bandwidth slots. So it is FDMA. Again 200kHZ bandwidth allocated to 8 users in time slots. So GSM uses both TDMA and FDMA.

43. Ans:(c)

Sol: Transmission antenna height $h_t = 196m$

Reception antenna height $h_r = 49m$

Maximum possible link distance

$$d = 4.12\left(\sqrt{h_t} + \sqrt{h_r}\right)$$

$$= 4.12\left(\sqrt{196} + \sqrt{49}\right)$$

$$d = 86Km$$

44. Ans: (c)

45. Ans: (b)

46. Ans:(c)

Sol: (a) In soft hand-off there is no user's connection to be broken if we go from one cell site to another cell site. So it is **make- before- break.**

(b) In Hard hand-off there is user's connection to be broken if we go from one cell site to another cell site. So it is **break-before-make.**

47. Ans: (c)

48. Ans: (b)

49. Ans: (d)

Sol: As oxide thickness increases, it requires high voltage to invert the channel. Hence, threshold voltage increases

50. Ans:(a)

Sol: Fixed positive charges act as the positive gate to source voltage. Hence, threshold voltage decreases.

51. Ans: (d)

52. Ans: (b)

53. Ans: (b)

54. Ans: (a)

55. Ans: (c)

Sol: Scan chain introduces additional flip-flops and MUX and there by adding routing delay and area overhead.

56. Ans: (b)

Sol: At each node, we need two test vectors. Hence, at most '2m' test vectors are required.

57. Ans: (d)

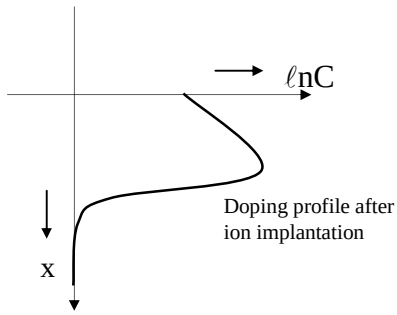
58. Ans:(d)

Sol: Clock period

$= 40 + 50 + 60 + 30 + 50$

$= 230$units of time

59. Ans: (c)



60. Ans: (c)

Sol: A → Latch up is the generation of a low-impedance path in CMOS chips between power supply and ground rails due to interconnection of parasitic pnp and npn bipolar transistors

B → Channeling occurs when some ions travel across the substrate and don't collide with the atoms in the lattice.

D→ in EBL-Pattern developed is wider than that of the desired pattern due to proximity effect

61. Ans: (d)

62. Ans: (c)

63. Ans: (a)

Sol: Birds beak problem occurs due to isotropic nature of Si-oxidation in LOCOS process only.

64. Ans: (b)

65. Ans: (a)

66. Ans: (a)

Sol: All files are contained in same directory, Hence to uniquely identify a file, each file should have unique name.

67. Ans: (d)

Sol: Multitasking OS uses Round-Robin scheduling for process execution.

68. Ans : (a)

69. Ans: (d)

Sol: In I/O mapped IO, maximum number of IO devices that can be addressed by the CPU is 512 when it's port address size is 8 bit

70. Ans: (d)

Sol: Pipeline doesn't reduce the time taken to perform an individual task but it achieves speed up by processing the tasks in parallel.

71. Ans: (a)

72. Ans: (a)

73. Ans:(a)

74. Ans:(b)

Sol: In ion implantation, high velocity dopant ions collide with the host atoms resulting in the lattice damages.

75. Ans: (a)

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