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MAIN EXAMINATION

AUGUST - DECEMBER 2018 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

ODEL / REGULAR PROGRAMME

CID 081: INTERMEDIATE BUSINESS MATHEMATICS

Date: DECEMBER 2018	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions	

Q1. a) Use Pascal's triangle to expand the following:

i) $(1 - 5x)^5$ **(3 marks)**

ii) $(a - b)^7$ **(3 marks)**

b) An equipment test is repeated on three separate occasions. The probability that the test is successful on each occasion is 0.35. calculate the probability that out of the three tests, there are:

i) 0 **(3 marks)**

ii) 1 **(3 marks)**

iii) 2 **(3 marks)**

iv) 3 successes in total. **(3 marks)**

v) Tabulate the number of successes against their respective probabilities as calculated in i) to ii) above. **(3 marks)**

c) The total cost function of output is given by $C = \frac{2}{3}x + \frac{35}{2}$.

Find:

i) Cost when output is 4 units. **(3 marks)**

ii) Average cost of output of 10 units **(3 marks)**

iii) Marginal cost when output is 3 units. **(3 marks)**

Q2. A committee of 4 must be chosen from 3 women and 4 men. Calculate:

a) In how many ways the committee can be chosen? **(5 marks)**

b) In how many ways 2 men and 2 women can be chosen? **(5 marks)**

c) The probability that committee consists of 2 men and 2 women. **(5 marks)**

d) The probability that committee consists of at least 2 women. **(5 marks)**

Q3. a) Differentiate the following:

i) If $y = x^2 + 2x + 9e^x - \log x$ **(4 marks)**

ii) $X^2(x + 1)(x^3 + 3x + 1)$ **(4 marks)**

iii) $X^3 + 5x^2 - 7x + 2$ four times w.r.t 'x' **(4 marks)**

b) Integrate the following:

i) $\int(2x^2 - 6x + 4)^{3/2}(2x - 3)dx$ **(4 marks)**

ii) $\int x^n \log x \, dx$ **(4 marks)**

Q4. a) Use the binomial theorem to expand:

i) $(1 + x)^4$ **(4 marks)**

ii) $(1- 2x)^3$ **(4 marks)**

iii) $1 - 3x)^4$ **(4 marks)**

b) Find the coefficient of x^5 in the expression of $(1 + 4x)^9$ **(4 marks)**

a) Find the first four terms in the expression $(2 + \frac{x}{3})^{12}$ **(4 marks)**

CID 081: INTERMEDIATE BUSINESS MATHEMATICS

1. $0! = 1$
2. ${}^nP_r$ or ${}_nP_r = \frac{n!}{(n-1)!}$
3. ${}^nP_n = n!$
4. $n! = n(n-1)(n-2)(n-3)\ldots1$
5. ${}^nP_r = n(n-1)(n-2)(n-3)\ldots [n-(r-1)]$
6. ${}^nC_r$ or ${}_nC_n = \frac{n(n-1)(n-2)(n-3)\ldots[n-(r-1)]}{r!}$
7. ${}^nC_r = \frac{n!}{r!(n-1)!}$ Where r = 0.1,2,3… n
8. ${}^nC_0 = 1$
9. ${}^nC_n = 1$
10. ${}^nC_{n-r} = {}^nC_r$, where r = 0,1,2,3… n
11. ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$
12. ${}^nC_{n-r} = \frac{n!}{(n-1)!r!}$ where r = 0,1,2,3… n
13. $\frac{d}{dx}(x^n) = nx^{n-1}$
14. $\frac{d}{dx}$ (constant) = 0 (zero)
15. $\frac{d}{dx}$ (constant x function) = constant x $\frac{d}{dx}$ x function

16. $\frac{d}{dx}$ (u + v) = $\frac{du}{dx} + \frac{dv}{dx}$
17. $\frac{d}{dx}$ (u + v + w +…) = $\frac{du}{dx} + \frac{dv}{dx} + \frac{dw}{dx}$ + …
18. $\frac{d}{dx}$ (u - v) = $\frac{du}{dx} - \frac{dv}{dx}$
19. $\frac{d}{dx}$ (u - v - w -…) = $\frac{du}{dx} - \frac{dv}{dx} - \frac{dw}{dx}$ - …
20. $\frac{d}{dx}$ (uv) = u$\frac{dv}{dx}$(v) +v $\frac{du}{dx}$(u)
21. $\frac{d}{dx}(\frac{u}{v}) = \frac{v\frac{du}{dx}u - u\frac{dv}{dx}v}{v^2} = \frac{Dr)(\frac{du}{dx}(Nr) - (Nr)\frac{dv}{dx}(Dr)}{(Dr)^2}$
22. $\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$
23. $\frac{d}{dx}(a^x) = a^x \log a$
24. $\frac{d^2y}{dx^2} = \frac{d}{dx}.\frac{dy}{dx}$
25. $\frac{d}{dx}$(uvw) = uv$\frac{dw}{dx}$ + uw$\frac{dv}{dx}$ +vw$\frac{du}{dx}$
26. $\int x^n\,dx = \frac{x^{n+1}}{n+1}$ + c
27. $\int \frac{1}{x}dx$ = $\log_e$x + c
28. $\int e^{ax}dx = \frac{e^{ax}}{a}$ + c
29. $\int a^x\,dx = \frac{a^x}{\log a}$ + c
30. $\int kdx$ = $kx + c$
31. $\int e^x dx = e^x$ + c
32. $\int 1.dx$ = x + c
33. $\int (ax+b)^n dx = \frac{1}{a}.\frac{(ax+b)^{n+1}}{(n+1)}$ + c
34. $\int \frac{dx}{ax+b}$ = $\frac{1}{a}$.log (ax + b) + c
35. $\int e^{ax+b}dx = \frac{1}{a}.e^{ax+b}$ + c
36. $\int u\frac{dv}{dx}dx$ = uv - $\int v\frac{du}{dx}dx$ + c OR $\int uvdx$ = $uv^1 + u'v^2 + u''v^3 - u'''v^4$ - …
37. $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx = if\ f(x) is\ even \\ 0 \qquad\qquad if\ f(x) is\ 0dd \end{cases}$
38. $\int_a^h f(x)dx$ = [g(x) + c]$_a^h$

= $\{g(b) + c\}$ - $\{g(a) + c\}$

= g(b) – g(a)

39. $\int \frac{f\prime(x)}{f(x)}dx$ where f'(x) is the derivative of f(x)

Put f(x) = t, then f'(x)dx = dt

Thus $\int \frac{f\prime(x)}{f(x)}dx = \int \frac{dt}{t}$ log t = log f(x)

40. $\int [f(x)]^n f'(x)dx, n \neq -1$ put f(x) = t, then f'(x)dx = dt

Thus $[f(x)]^n f'(x)dx = \int t^n dt = \frac{t^{n+1}}{n+1} = \frac{[f(x)]^{n+1}}{n+1}$

41. $\int f'(ax+b)dx$, put (ax + b) = i, then adx = dt, dx = $\frac{dt}{a}$

Thus $\int f'(ax+b)dx = \int f'(t)\frac{dt}{a} = \frac{1}{a}\int f'(t)dt = \frac{1}{a}[f(t)] = \frac{f(ax+b)}{a}$

42. Revenue = price times quantity

R(x) = Px

43. Profit = revenue minus cost

P(x) = R(x) – C(x)

44. Breakeven point (BEP)

Revenue = Cost

R(x) = C(x)

Profit = zero (0)

P(x) = 0

END